Electronic Cash Payment System

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***Abstract* — Electronic cash payment systems come in many forms including digital checks, debit cards, credit cards, and stored value cards. The usual security features for such systems are privacy (protection from eavesdropping), authenticity (provides user identification and message integrity), and no repudiation (prevention of later denying having performed a transaction).**

The type of electronic payment system focused on in this paper is electronic cash. As the name implies, electronic cash is an attempt to build an electronic payment system modeled after our paper cash system. Paper cash has such features as being: portable (easily carried), recognizable (as legal tender) hence readily acceptable, transferable (without involvement of the financial network), untraceable (no record of where money is spent), anonymous (no record of who spent the money) and has the ability to make "change." The designers of electronic cash focused on preserving the main features of untraceable and anonymity. Thus, electronic cash is defined to be an electronic payment system that provides, in addition to the above security features, the properties of user anonymity and payment untraceable. E payment system is online interaction between buyer and seller and It is secure with the help of SET protocol.

Keyword*:* authenticity, portable, anonymous, untraceable, repudiation.

I. INTRODUCTION

Electronics cash payment system is a mode of payments over an electronic network such as the internet. In other words we can say that e-payment is a method in which a person can make Online Payments for his purchase of goods and services without physical transmmission of cash and cheques, irrespective of time and location. Electronic payment system is the based on-line payments and on-line payment system development is a huge form of electronic payments. It makes electronic payments at any time work on the internet directly to manage the e-business environment. There are two distinct types of payment systems:

1.Internet–Based payment system- There are four models of Internet-Based payment system, e-cash, Credit Card, Debit Card, and Smart Card.

2.Electronic Transaction-Based payment system there are four models of Internet-Based payment system, Secure Electronic Transaction (SET), Cyber Cash, Net Bill, First Virtual Holdings.

EPS (Electronic Payment) System is the most major aspect of any civilization. Improving E-cash Payment System can bring prosperity into all segments of society. In today's world there has been a major change to the E-cash Payment System industry. Computerization of E-Cash Payment System has taken the world by a storm. There are significant improvements in the areas of initiating sale of products, placing orders, making payments, and transfer of funds. This has led to a much better global economy better living standard for all. Commodity Money slowly evolved into standard of having paper notes at the exchange parameter. The cash payment method does not require the seller to like the commodity that he/she is going to receive in exchange for the goods. About 80 percent of all the transactions in the world are done through cash payment. The process is simple and there is no bank involvement. There is however an overhead of printing notes. The cash payment method is very insecure. There is no record of the transaction maintained. There is a possibility for generating counterfeit notes.

Electronic Cash system is defined as a monetary transaction that occurs electronically as opposed to the physical exchange of money or checks. ECS involves trading using the latest electronic equipment and software between the sellers and the buyers. The trade in E-Cash Payment System is conducted in a slightly different way than the traditional trading. The earliest form of automation in the financial industry was done to automate the functions of clearing house in bank associations. In 1968, group of California Bankers formed Special Committee on Paperless Entries (SCOPE) which led to the formation in 1972 of California Clearing House Association. Electronic Payments can be categorized as Stored Account Payments or Stored Value Payments. In a stored account payment, the buyer and the merchant maintain accounts with a bank. The transactions are registered and the actual transfer of funds takes place at a later stage through settlement. Examples of Stored Account payment System include Credit Cards, Debit card.

II.LITERECHER REVIEW

E-Cash is purely software based; anonymous, untraceable, online payment system, available on UNIX, Windows as well as Macintosh platform. When the tokens purchased by customers.

3.1 E-Cash software stores the digital money on the customer's personal computer which is under signed by the bank. The users can easily spend digital money at any shop accepting e-Cash without giving credit card details to the shopkeeper.

3.2 Credit Card- A credit card is a plastic card issued to the users to lent money for purchase of goods and services. The customer type the card number, expiry date and billing address on the order form and the vendor can verify the details and be confident of payment. The credit card payment on the online network can be categorized into three types:

(a) Payment using plain credit card details
(b) Payment using encrypted credit card details
(c) Payment using third party verification

3.3 Debit Card- A Debit card is a banking card enhanced with Automated Teller Machine and point of sale features so that it can be used at merchant locations. A Debit card is linked to an individual bank account, allowing funds to be withdrawn. ATM and point of sale without writing a cheque There are two types of debit card which are used in real world:

(a) Online debit card

(b) Offline debit card

3.4 Smart Card- A smart card was first produced in 1977 by Motorola. It is a thin, credit card sized piece of plastic which contains a half-inch-square area that serves as the card input-output system. A smart card contains a programmable chip, a combination of RAM and ROM storage and can be refilled by connecting to the bank. It is known as smart card because the ability of chip to store the information in its memory makes the card smart.

3.5 Secure Electronic Transaction (SET)- Secure electronic transaction is a system of online payments for ensuring the security of financial transactions on the internet. The SET specification is an open, technical standard for commerce, developed by VISA and master card. It facilitates secure payment card transactions over the internet. Digital certificate create a trust change throughout the transactions, verifying cardholders and merchant validity and provide the confidentiality payment information and enable confidentiality of order information that is transmitted with payment information .ensure integrity for all transmitted data.

3.6 Cyber Cash- Cyber cash is a web based service that automatically processes and verifies customer's credit card information then debiting the customers account and crediting the merchant's account electronically. Cyber cash servers act as a gateway between the merchant on the internet and bank's secure financial network.

3.7 Net Bill- Net bill is a micro payment system. Net bill payment system uses internet for purchasing goods and services and makes secure and economical payments for them and its transaction framework uses a distributed transaction protocol with a centralized billing server to provide a funds transfer mechanism.

3.8 First Virtual Holdings- First virtual is one of the first internet payment system that offered a third party verification method to make payment over the internet. The first virtual payment system is unique in the sense that it does not use encryption

III. Analysis Problem

3.1 Lack of Usability- Electronic payment system requires large amount of information from end users or make transactions more difficult by using complex elaborated websites interfaces. For example credit card payments through a website are not easiest way to pay as this system requires large amount of personal data and contact details in web form.

3.2 Lack of Security- Online payment systems for the internet are an easy target for stealing money and personal information. This data is sometimes transmitted in an un-secured way. Providing these details by mail or over the telephone also entails security risks.

3.3 Issues with e-Cash- The main problem of e-cash is that it is not universally accepted because it is necessary that the commercial establishment accept it as payment method. Another problem is that when we makes payment by using e-cash, the client and the salesman have accounts in the same bank which issue e-cash. The payment is not valid in other banks.

3.4 Lack of Trust- Electronic payments have a long history of fraud, misuse and low reliability as well as it is new system without established positive reputation. Potential customers often mention this risk as the key reason why they do not trust a payment services and therefore do not make internet purchases.

The payment information contains private financial data that should be transferred using the most secure methodologies. The paper also discusses the various methods employed to incorporate security into electronic payment systems. Communication between trading partners called buyers and sellers are done using specific protocols called payment protocols.

IV. Overview

- Cash payment is currently most popular form in conventional payment system in the world.

- Currently cash payment involves 75% - 95% of all transactions are paid in cash.

- Transactions are paid in a cash form (such as $ bill) from a buyer to a seller.

There are three types of users: - payer or consumer - a payee, such as a merchant - a financial network with whom both payer and payee have accounts.

V. HELPFUL HINTS

4.1 **Electronic Payment:** The term electronic commerce refers to any financial transaction involving the electronic transmission of information. The packets of information being transmitted are commonly called electronic tokens . One should not confuse the token, which is a sequence of bits, with the physical media used to store and transmit the information. A particular kind of electronic commerce is that of electronic payment . An electronic payment protocol is a series of transactions, at the end of which a payment has been made, using a token issued by a third party. The most common example is that of credit cards when an electronic approval process is used.

4.2 **Component of E-Cash System**: There are four major components in an electronic cash system: issuers, customers, merchants, and regulators. Issuers can be banks, or non-bank institutions; customers are referred to users who spend E-Cash; merchants are vendors who receive E-Cash, and regulators are defined as related government agencies. For an E-Cash transaction to occur, we need to go through at least three stages:

1. Account Setup: Customers will need to obtain E-Cash accounts through certain issuers. Merchants who would like to accept E-Cash will also need to arrange accounts from various E-Cash issuers. Issuers typically handle accounting for customers and merchants.

2. Purchase: Customers purchase certain goods or services, and give the merchants tokens which represent equivalent E-Cash. Purchase information is usually encrypted when transmitting in the networks.

3. Authentication: Merchants will need to contact E-Cash issuers about the purchase and the amount of E-Cash involved. E-Cash issuers will then authenticate the transaction and approve the amount E-Cash involved.

4.3 **Classification of E-Cash:**

E-Cash could be on-line, or off-line:

4.3.1 On-Line E-Cash refers to amount of digital money kept by your E-Cash issuers, which is only accessible via the network. Off-line E-Cash refers to digital money which you keep in your electronic wallet or other forms of off-line devices

4.3.2 Off-line payment means that Bob submits Alice's electronic coin for verification and deposit sometime after the payment transaction is completed. (This method resembles how we make small purchases today by personal check.)

5. **Properties of Electronics Cash:**

Specifically, e-cash must have the following four properties, monetary value, interoperability, retrievability & security.

4.5.1 Monetrary value :E-cash must have a monetary value; it must be backed by either cash (currency), or a back-certified cashiers checqe when e-cash create by one bank is accepted by others , reconciliation must occur without any problem. Stated another way e-cash without proper bank certification carries the risk that when deposited, it might be return for insufficient funds.

4.5.2 Interoperable :E-cash must be interoperable that is exchangeable as payment for other e-cash, paper cash, goods or services , lines of credits, deposit in banking accounts, bank notes , electronic benefits transfer information .

4.5.3 Storable & Retrievable: Remote storage and retrievable (e.g. from a telephone and communication device) would allow user to exchange e-cash (e.g. withdraw from and deposit into banking accounts) from home or office or while traveling .

4.6**. E-Cash Security:**Security is of extreme importance when dealing with monetary transactions. Faith in the security of the medium of exchange, whether paper or digital, is essential for the economy to function.

There are several aspects to security when dealing with E-cash. The first issue is the security of the transaction. How does one know that the E-cash is valid? Encryption and special serial numbers are suppose to allow the issuing bank to verify (quickly) the authenticity of E-cash. These methods are suseptible to hackers, just as paper currency can be counterfeited. However, promoters of E-cash point out that the encryption methods used for electronic money are the same as those used to protect nuclear weapon systems. The encryption security has to also extend to the smartcard chips to insure that they are tamper resistant. While it is feasible that a system wide breach could occur, it is highly unlikely. Just as the Federal Government keeps a step ahead of the counterfeiters, cryptography stays a step ahead of hackers.

4.7 Secure Electronic Transaction (SET) protocol:

(**SET**) was a communications protocol standard for securing credit card transactions over insecure., specifically, the Internet. SET was not itself a payment system, but rather a set of security protocols and formats that enabled users to employ the existing credit card payment infrastructure on an open network in a secure fashion. However, it failed to gain attraction in the market. VISA now promotes the 3-D Secure schem. SET was developed by the **SET Consortium**, established in 1996 by VISA and MasterCard in cooperation with GTE, IBM, Microsoft, Netscape, SAIC, Terisa Systems, RSA, and VeriSign. The consortium's goal was to combine the card associations' similar but incompatible protocols (STT from Visa/Microsoft and SEPP from MasterCard/IBM) into a single standard. Master card and netscape have support Secure Electronic Protocol which one of the method for securing transaction.

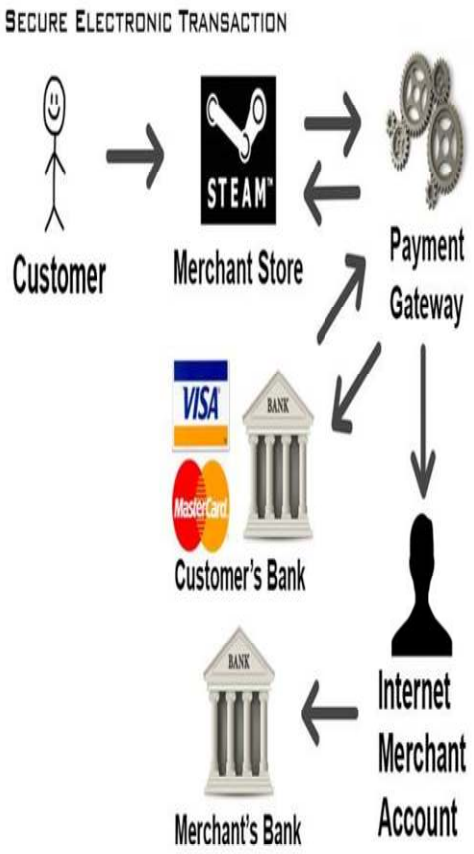
SET is a special protocol, which is used to handle the various electronic transaction. It provide more security technologies, which reduce the change of information loss.it also use the cryptography technique to make the application more secure.

How it Work:

Both cardholders and merchants must register with CA (certificate authority) first, before they can buy or sell on the Internet. Once registration is done, cardholder and merchant can start to do transactions, which involve 9 basic steps in this protocol, which is simplified.

Customer browses website and decides on what to purchase

1. Customer sends order and payment information, which includes 2 parts in one message:
   a. Purchase Order – this part is for merchant
   b. Card Information – this part is for merchant's bank only.
2. Merchant forwards card information (part b) to their bank
3. Merchant's bank checks with Issuer for payment authorization



4. Issuer send authorization to Merchant's bank
5. Merchant's bank send authorization to merchant.
6. Merchant completes the order and sends confirmation to the customer
7. Merchant captures the transaction from their bank
8. Issuer prints credit card bill (invoice) to customer.

Fig1.Secure Electronic Transaction

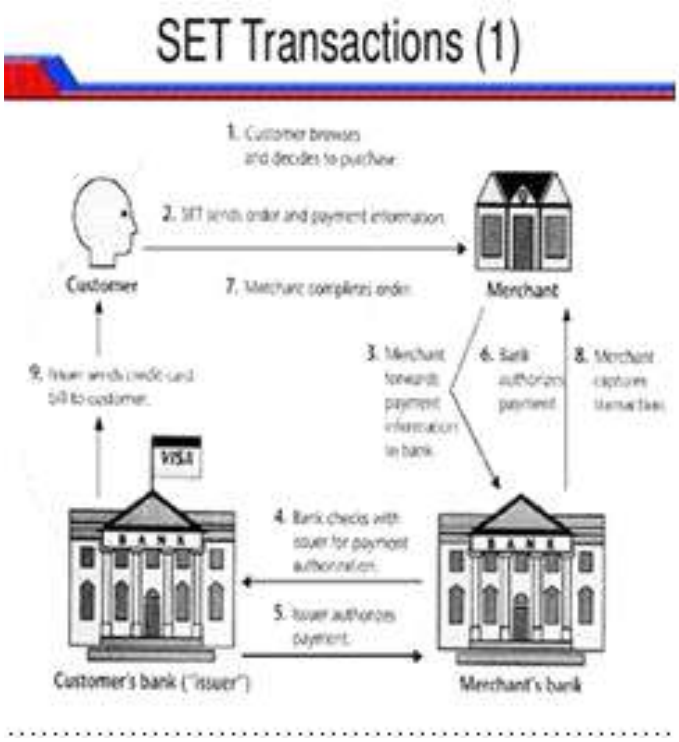


Fig 2:SET Protocol

Conclusion

Electronic payment refers to the mode of payment which does not include physical cash or cheques. It includes debit card, credit card, smart card, e-wallet etc. E-commerce has its main link in its development on–line in the use of payment methods, some of which we have analysed in this work .The risk to the online payments are theft of payments data, personal data and fraudulent rejection on the part of customers.Therefore, and until the use of electronic signatures is wide spread, we must use the technology available for the moment to guarantee a reasonable minimum level of security on the network. With respect to the payments methods they have been analysed in this work, it is impossible to say that any one of them is perfect, although each one of them has advantages as opposed to others. If the client wants to maintain privacy, then they choose those payment methods which guarantee a higher level of privacy such as E-cash or Net Bill Checks. If the priority is security, they should use, Smart Cards. Both consumers and service providers can benefit from e-payment systems leading to increase national competitiveness in the long run. The successful implementations of electronic payment systems depends on how the perceived by consumers as well as sellers are popularly managed , in turn would improve the market confidence in the system. security and privacy dimensions perceived by consumers as well as sellers are popularly managed , in turn would improve the market confidence in the system.

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