Survey of Electronic Payment Systems

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Abstract—**Electronic Payment is a financial exchange that takes place online between buyers and sellers. Electronic payments are financial transactions made without the use of paper documents such as cheques. Electronic payments include debit card, credit card, smart card, e-wallet, e-cash, electronic cheques etc. E-payment systems have received different acceptance level throughout the world; some methods of electronic payments are highly adopted while others are relatively low. Recognizing this, virtually all interested parties are exploring various types of electronic payment systems, issues surrounding electronic payment system and digital currency. In this survey aimed to identify the issues and challenges of electronic payment systems and offer some solutions to improve the e-payment system quality.**

Keywords- Cyber Cash, Digital Signatures, e-Cash, Electronic Payments, Encryption, First Virtual Holdings, Net Bill, RAM.

I. INTRODUCTION

Electronic Payment is a financial exchange that takes place online between buyers and sellers. The content of this exchange is usually some form of digital financial instrument (such as encrypted credit card numbers, electronic cheques or digital cash[6]) that is backed by a bank or an intermediary, or by a legal tender. Electronic 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 transfer of cash and cheques, irrespective of time and location. Electronic payment system is the basis of on-line payments and on-line payment system development is a higher form of electronic payments. It makes electronic payments at any time through the internet directly to manage the e-business environment. In real world we have Internet–Based payment system, & Electronic Transaction-Based payment system are used.

II. LITERATURE REVIEW

An electronic payment system[1] (EPS) is a system of financial exchange between buyers and sellers in the online environment that is facilitated by a digital financial instrument (such as encrypted credit card numbers, electronic checks, or digital cash) backed by a bank, an intermediary, or by legal tender [08]. The Internet is now a commercial place in which payments are rendered for goods, information and services. To support such e-commerce some form of money must be exchanged over the Internet. The Nigerian economy have maintained appreciable growth due to the volume of e-commerce activities, particularly on the online retail genre of business, which has a large support from the local and international banks [10]. A secure payment method - electronic payment system - is required as a compensation for information, goods and services provided on the web (for example, access to copyrighted materials) and as a convenient way to pay for external goods and services [09]. It helps to automate sales activities, extends the potential number of customers and may reduce the amount of paperwork.

The various factors that have lead the financial institutions to make use of electronic payments[2],[5] are:

A. Decreasing technology cost:

The technology used in the networks is decreasing day by day, which is evident from the fact that computers are now dirt-cheap and Internet is becoming free almost everywhere in the world.

B. Reduced operational and processing cost:

Due to reduced technology cost the processing cost of various commerce activities becomes very less. A very simple reason to prove this is the fact that in electronic transactions we save both paper and time.

C. Increasing online commerce:

The above two factors have lead many institutions to go online and many others are following them.

We began E-Commerce with EDI, this was primarily for large business houses not for the common man. Many new technologies, innovations have lead to use of E-Commerce for the common man also. We will now briefly enumerate these innovations[3] based on whom they affected:

D. Affecting the consumers:

Credit cards, Debit Cards, ATMs (Automated Teller Machines), Stored value cards, E-Banking.

E. Enabling online commerce:

Digital Cash, E-Cash, Smart cards (or Electronic Purse) and encrypted Credit cards.

F. Affecting Companies:

The payment mechanisms that a bank provides to a company have changed drastically. The Company can now directly deposit money into its employee's bank account. These transfers are done through Automated Transfer Houses.

There are also many problems with the traditional payment systems that are leading to its fade out. Some of them are enumerated below:

G. Lack of Convenience:

Traditional payment systems require the consumer to either send paper cheques by snail-mail or require him/her to physically come over and sign papers before performing a transaction. This may lead to annoying circumstances sometimes.

H. Lack of Security:

This is because the consumer has to send all confidential data on a paper, which is not encrypted, that too by post where it may be read by anyone.

I. Lack of Coverage:

When we talk in terms of current businesses, they span many countries or states. These business houses need faster transactions everywhere. This is not possible without the bank having branch near all of the companies offices. This statement is self-explanatory.

J. Lack of Eligibility:

Not all potential buyers may have a bank account.

K. Lack of support for micro-transactions:

Many transactions done on the Internet are of very low cost though they involve data flow between two entities in two countries. The same if done on paper may not be feasible at all.

III. EPS SYSTEM

We will now focus attention on the various ways available to pay online these methods of payment[12] are still new even when seen as a technology[4]. Each has its own benefits and shortcomings:

1) Electronic Tokens

An electronic token is a digital analog of various forms of payment backed by a bank or financial institution. There are two types of tokens:

Real Time: (or Pre-paid tokens) - These are exchanged between buyer and seller, their users pre-pay for tokens that serve as currency. Transactions are settled with the exchange of these tokens. Examples of these are DigiCash, Debit Cards, Electronic purse etc.

Post Paid Tokens – are used with fund transfer instructions between the buyer and seller. Examples – Electronic cheques, Credit card data etc.

2) Electronic or Digital Cash

This combines computerized convenience with security and privacy that improve upon paper cash. Cash is still the dominant form of payment as: The consumer still mistrusts the banks. The non-cash transactions are inefficiently cleared. In addition, due to negative real interests rates on bank deposits. Now we will enumerate some qualities of cash:

Cash is a legal tender i.e. payee is obligatory to take it.
It is negotiable i.e. can be given or traded to someone else.
It is a bearer instrument i.e. possession is proof of ownership.
Must be interoperable or exchangeable as payment for other digital cash, paper cash, goods or services, lines of credit, bank notes or obligations, electronic benefit transfers and the like. Must be storable and retrievable:

Cash could be stored on a remote computer's memory, in smart cards, or on other easily transported standard or special purpose devices. Remote storage or retrieval would allow users to exchange digital cash from home or office or while traveling.

3) Electronic Cheques

The electronic cheques are modeled on paper checks, except that they are initiated electronically. They use digital signatures for signing and endorsing and require the use of digital certificates to authenticate the payer, the payer's bank and bank account. They are delivered either by direct transmission using telephone lines or by public networks such as the Internet.

Benefits of electronic Cheques:
Well suited for clearing micro payments. Conventional cryptography of e-cheques makes them easier to process than systems based on public key cryptography (like digital cash). They can serve corporate markets. Firms can use them in more cost-effective manner. They create float and the availability of float is an important requirement of Commerce.

4) E-BANKING

E-Banking offers an inexpensive alternative to branching to expand a bank's customer base, and many banks are using e-banking to increase services to their customers. Many banks have started websites on the Internet and many plan to offer banking services over the Internet. Role of e-commerce in banking is multifaceted impacted by,

- Changes in technology.
- Rapid deregularization of many parts of finance.
- Emergence of new banking institutions.
- Basic economic restructuring.

IV. Types Of Electronic Payment System

E-commerce sites use electronic payment, where electronic payment refers to paperless monetary transactions[7]. Electronic payment has revolutionized the business processing by reducing the paperwork, transaction costs, and labor cost. Being user friendly and less time-consuming than manual processing, it helps business organization to expand its market reach/expansion[14]. Listed below are some of the modes of electronic payments −

i) Credit Card

Payment using credit card is one of most common mode of electronic payment. Credit card is small plastic card with a unique number attached with an account. It has also a magnetic strip embedded in it which is used to read credit card via card readers. When a customer purchases a product via credit card, credit card issuer bank pays on behalf of the customer and customer has a certain time period after which he/she can pay the credit card bill. It is usually credit card monthly payment cycle. Following are the actors in the credit card system.

ii) Debit Card

Debit card, like credit card, is a small plastic card with a unique number mapped with the bank account number. It is required to have a bank account before getting a debit card from the bank. The major difference between a debit card and a credit card is that in case of payment through debit card, the amount gets deducted from the card's bank account immediately and there should be sufficient balance in the bank account for the transaction to get completed; whereas in case of a credit card transaction, there is no such compulsion.
Debit cards free the customer to carry cash and cheques. Even merchants accept a debit card readily. Having a restriction on the amount that can be withdrawn in a day using a debit card helps the customer to keep a check on his/her spending.

iii) Smart Card

Smart card is again similar to a credit card or a debit card in appearance, but it has a small microprocessor chip embedded in it. It has the capacity to store a customer's work-related and/or personal information. Smart cards are also used to store money and the amount gets deducted after every transaction.

Smart cards can only be accessed using a PIN that every customer is assigned with. Smart cards are secure, as they store information in encrypted format and are less expensive/provides faster processing. Mondex and Visa Cash cards are examples of smart cards.

iv) E-Money

E-Money transactions refer to situation where payment is done over the network and the amount gets transferred from one financial body to another financial body without any involvement of a middleman. E-money transactions are faster, convenient, and saves a lot of time[15].

Online payments done via credit cards, debit cards, or smart cards are examples of E-money transactions[11]. Another popular example is e-cash. In case of e-cash, both customer and merchant have to sign up with the bank or company issuing e-cash.

v) Electronic Fund Transfer

It is a very popular electronic payment method to transfer money from one bank account to another bank account. Accounts can be in the same bank or different banks. Fund transfer can be done using ATM (Automated Teller Machine) or using a computer.

Currently, internet-based EFT is getting popular. In this case, a customer uses the website provided by the bank, logs in to the bank's website and registers another bank account. He/she then places a request to transfer certain amount to that account. Customer's bank transfers the amount to other account if it is in the same bank, otherwise the transfer request is forwarded to an ACH (Automated Clearing House) to transfer the amount to other account and the amount is deducted from the customer's account. Once the amount is transferred to other account, the customer is notified of the fund transfer by the bank.

V. Conclusion

This paper presents a complete review of the different categories of electronic payment systems in terms of online payment processes, authentication mechanisms, and authentication types. The paper further demonstrates the application of the different authentication mechanisms and types in the categories of the electronic payments system highlighted. Finally, analysis reveals that electronic payment systems with authentication mechanisms involving two or more authentication factors tend to be more secured, reduced fraud vulnerability, and boost users' confidence in using electronic payment systems.

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