

MEANS OF PAYMENT IN E-COMMERCE (CREDIT CARDS AND E-MONEY)

Mihaela Loredana LĂPĂDUȘI, Assistant, Ph.D. Candidate
„Constantin Brâncuși” University, Tg-Jiu

Keywords: e-commerce, First Virtual, e-cash, Net-Cash.

Abstract Once the web has spread and due to the great mass of users, firms with trade activity intensified their commercial transactions on-line. Thus the e-commerce implies e-payments which lead to creating e-money and implicitly some specific means of payment, all of these used with the aim of deployment and development of commercial transactions on-line.

On the background of perspectives and especially of business viability within the context of a new economy, in which traditional economy co-exists with the digital one, the companies are conditioned to absorb new knowledge specific to the actual informational society, within which an important place is held by e-commerce as a trade modality being equivalent to the most recent revolution in the commerce. The informational society has brought about an impressive number of political, economic and social alterations due to which the Internet has become an important factor for international development of the rules and mechanisms in market economy.

The emergence, development and diversification of international commercial transactions paralleled by the development of e-commerce in each and every societal sphere led to a more and more obvious tendency of the companies to use web in order to develop a new type of commerce, the e-commerce through the agency of the Internet. Thus through the agency of the Internet a wide range of activities may be performed from shopping at a low scale to impressive business operating millions of euros.

The traditional patterns of payment refer to money transfer as cash payment or through the agency of documents (checks, payment order, and promissory note, documentary L / C etc.). On regular terms, payment supposes opening an account with a bank, going to the head office of the bank to deposit the money and / or starting the transfer in the merchandiser's account. This may ask or not the authentication of the payment through the agency of the fax. The last and the longest stage is the delivery through the network of delivery of the company or through the specialized mail.

In e-commerce there is no need to go to the bank to pay the demanders or suppliers of goods and services the role of the bank is to transform the cash into bits. Maybe the cash cannot be removed completely, but they will surely be transformed more and more into electronic money. The new type of commerce has encouraged the demand for new adequate methods of payment. Developing new commercial activities among partners geographically situated at long distances cannot exist without using electronic methods of payment. The new methods of payment through the Internet allow convenient, safe and rapid money transfer among the business partners.

In the domain of the methods of e-payment the research is in progress. They are developing innumerable systems others have just been researched and analyzed.

The e-payments have to be:

- **secure**, that is they have to allow performing the financial transactions under

conditions of maximum security on line as for example the Internet;

- **anonymous**, that is the clients' identity and the performed transactions have to be protected;

- **convertible** – the users of the system (clients and suppliers) work with different banks, that is why it necessary that a currency issued by a bank be accepted by another;

- **usable** – the payment methods should be easy to use and accept; the company which would like its products sold on-line, have no chance in case the clients do not agree the idea of on-line business;

- **scalable** – a system is scalable if it may bear new users, new resources without suffering notable decline in performance. The method of payment has to allow both the clients and the company to be integrated within the system without affecting its structure;

- **transferable** – refers to the ability of a receipt to start the money transfer from one account into another without being necessary fro the supplier or customer to contact the bank directly;

- **flexible** – it is necessary that the system accept alternative modalities of payment depending on the collateral the parties performing the transaction require, on the necessary time for performing the payment, the performance requirements and on the value of the transaction. The infrastructural base on which the payments are performed has to put up with different modalities of payment including credit cards, personal checks and anonymous e-money;

- **efficient** – the term refers to the necessary cost to perform a transaction. An efficient method of payment has to be able to ensure cut down costs depending on the benefits it brings;

- **integrated** – it is implied that the system should bear the existent applications, to offer means to integrate other applications irrespective from the hardware platform or network;

- **trust** – the system of payment has to be permanently available and avoid the possible errors.

Of the systems of payment, the most often used in the e-commerce are: those based on the

classical credit cards and those based on e-money (First Virtual, e-cash, NetCash).

The methods of payment based on classical credit cards

The credit card represents the agency of e-payment, respectively the support of standardized, secure and individual information, allowing the holder to utilize the own available pecuniary means in an open account in his name at the issuer of the card or to utilize a credit line within the limit previously established, opened by the issuer to the benefit of the card holder, with view to perform cumulatively or not the following operations: withdraw of cash, payment for the goods and services required and accepted by the companies and payment of the duties to the public administration authorities, transfer of funds among accounts, others than those required and commanded by the financial institutions.

Despite the promotional campaigns adventitiously carried on, except the credit cards none of the new modalities of payment did not attain the critical point.

The credit cards will remain the favourite methods of payment for 99% of the on-line shopping. The on-line transactions using the cards payment are protected cryptographically, whereas the concrete modality for cryptography ensures the fact that in the case of credit cards only the bank or the supplier of services will be able to read

the credit card number and the company not. Cryptography is the most important technology for guaranteeing the functioning of different types of e-payments, securing the e-values from stealing, inadequate usage or forgery.

The mechanism of the classic credit card payment supposes the concluding of some alliances with financial institutions and one of the first steps that the company has to do is to open an account with one of the banks offering transactions on-line based on cards. The expenses the company has to put up with may be: fixed expenses for acquiring or renting the afferent equipment or soft necessary to the performance of the secure communication with the bank, as well as different expenses resulted after the commissions charged for the transaction by the bank. The financial institution usually enjoins a minimum volume of transaction per month (minimum variable accepted cost), charging a minimum sum, which the company pays irrespective of the number of transactions he carries on.

One of the advantages a company can obtain is to call on a card agency offering transactions on-line and the great volume the companies carry on may obtain significant price reductions.

After the company has opened the required banking account and completed the implementation of the informational system connecting it to the financial institutions or PSP (Payment Service Provider) it may begin the activity of e-commerce. After a client who has navigated on the merchandiser's website chooses the desired products and deposes them in the virtual basket, the purchaser is connected on-line with PSP who will require the necessary information to process the payment: the card type, the credit card number and the expiring date. Once this information is obtained, the e-commerce platform from PSP transmits it to the card agency it works with, as well as the lump sum to pay, the commission, the number of account of the merchandiser and the desired transaction type. Ultimately the information is encrypted and sent by the Payment Possessor (PP) through a secure communication line to an integrated facility system called interchange network processor (INP), each type of credits cards being processed by a distinct INP. The INP communicates on a secure line with the merchandiser's bank, which in turn makes contact with the purchaser's bank (that issued the card used by the client) to check if the funds are available. In affirmative case, the transaction is completed and the merchandiser's bank sends a *result-code* as a checking number to PSP. PSP sends forward this code to the soft that facilitates the shopping (shopping card software) which processes the data and then inform the client that the transaction is completed successfully or failed. Everything happens in a few seconds.

Systems based on electronic money

The electronic money are also called *cash electronic* or *cash digital* and represents the electronic transactions in the network, provided as a result of the funds transfer from one partner to another. **The electronic money may be:**

▪ **anonymous when its identity is unknown and is based on schemes of signature;**

▪ **identifiable** when they act at identifying the client; different schemes of digital signatures are used and is the electronic equivalent of credit cards or debit cards.

Generally the systems of electronic money include three distinct domains of activity:

1.learing, where the financial institutions, clearing houses and central bank perform the inter-banking operations resulted in the electronic transactions;

2.issuing, collecting and operation which ensure the issuing and obtaining the

electronic money and interacts with the clearing domain;

3.the effective transactions, where operations of loading take place (value transfer from issuer to users), payment (value transfers among users) and depositing (value transfer from users to issuers or other institution that deals with their collecting).

The representation of e-money is the electronically saved value and can be used in many ways:

- digital accounts, with transactions performed as debit operations balance-based;
- tokens uniquely identified through a serial number and associated with fixed value, which cannot be changed.

The electronic cash are different from the real ones through a series of characteristics:

-transferability – on practical terms it is restricted though the degree and type differs. Most of the systems allow the user to perform payment only towards merchandisers and the merchandisers perform their transfer only through the agency of banks.

-the shape of money – most of the payment methods are implemented through cards or software. The cards systems offer the consumers a portable electronic device, usually consisting in an integrated circuit with a microprocessor (*intelligent cards*). In this category are also included the systems using *electronic wallets*, devices offering special functions. Software based systems include products operating on fixed computers or laptops.

-the issuer structure – from the financial standpoint the number and structure of the institutions-issuers having certain duties in an electronic payment system are critical, affecting the implementation of the electronic cash system.

-clearance on-line – in the case of electronic transaction, on-line clearance by a third party is accomplished before performing the transaction or before the merchandiser to offer the goods and services to the consumer. The information is validated by a central operator or issuer and compared with the data kept in the data base. The clearance may be bestowed for all the transactions or only some of them (as the deposit ones in a bank account) and suppose a supplementary communication which may rise up the cost and time of transactions.

The concept of electronic cash includes also the methods of payment, which are similar to checks or credit cards. The cryptographic systems protect the conventional transactions, as account numbers and the values. The digital signature may replace the hand signature or the clearance of the credit card, whereas encrypting with public keys may ensure confidentiality. The electronic cash may have a series of supplementary functions as fro example:

-information collecting – the electronic transactions engender a series of financial information and security connected. The information may be kept temporarily or permanently on different devices at the level of the consumer, merchandiser or issuer. Some systems keep details for every transaction, others garble them saving them both at the merchandiser's level and the consumer's level, as well as in the consumer's cards or some other device implied in the transaction.

-some hardware or software devices presents the possibility to be re-loaded through a variety of methods including the direct withdraw from a bank account, cash or using a credit card. The direct withdraw from a bank account function as cash withdraw from a cash dispenser.

-the possibility of a single or multiple currencies; most of the systems use a single

currency, the national one, but there are systems using a multitude of national currencies.

The main systems of payment based on electronic cash are First Virtual (FV), e-cash and NetCash.

First Virtual (FV) is a system of payment for services and information provided on-line, easy to use and safe for the client, without depending on cryptic system and totally independent from the level of development of the utilized system, the e-mail being sufficient for appliance and carrying on of a system.

The mechanism of this system lies in the fact that the supplier e-mails the invoice directly to the First Virtual which then transmits for agreement to the client. The client may accept or refuse the invoice electronically e-mailed by First Virtual, the supplier taking over the entire risk of the transaction. Yet if a client systematically refuses the invoices, he may be removed from the system, as bad-debtor.

The client's subscription in the system suppose that he accesses the webpage of First Virtual and filling in of a subscription form which contains his identification data and his e-mail. Subsequently First Virtual delivers an answer to the client containing a subscription number, phone number as well as instructions referring to opening a FV account. The activation is done on the phone, the client transmitting his credit card number. After the activation the client receives identification number called *Virtual Pin* which will precedes all the transactions. In this system the client is not compelled to install a specific program on his PC

The merchandiser subscription consists in filling in a form to adhere to FV which includes his identification data and bank account. FV sets at his disposal for free the programs that allow a continuous dialogue between him and the adherent company.

E-cash is a system which was developed by DigiCash Company in Holland, founded by the notorious researcher of the cryptographic systems. David Chaum. E-cash represents an anonymous system of payment, which uses digital accounts in banks and the technique of blind signatures. E-cash represents money which is stored electronically in many ways as for example the debit cards and credit cards, money in electronic deposit, electronic checks.

The transactions are performed between the purchaser and the seller that have to have accounts with the same bank. The purchaser have to notice the bank regarding the fact that they would like to transfer the money in their usual accounts in the so-called e-cash Mint. Any time, the purchaser may interact from afar through his PC in the Mint account and using a soft client he may withdraw funds on his PC's disk. The format of these funds is electronic-series cryptographically protected. As a consequence the purchaser's disk becomes a genuine electronic wallet. Then payment may be performed to the individuals or companies through the agency of the e-cash.

Concerning the functioning principle e-cash has a private system: although the bank keeps a record of each of e-cash withdrawal and each deposit it is impossible for the bank to establish the subsequent utilization of e-cash. This property is due to using some crypto-systems with public keys. Besides the anonymous character pf payments, e-cash also ensures non-abdication that is that property which allows solving of disputes between the purchaser and the seller concerning the acknowledgement of payments. Also through checking the bank data base, any double spending of e-cash is blocked.

As well as the real money (banknotes, coins) the electronic money e-cash may be withdrawn from accounts or deposed to be used in transactions. Also as it happens with

physical money, a person may transfer the possession of an account e-cash to another person. Though unlike the conventional money, when a client pays to another client the e-bank apparently plays a modest part, but essential.

E-cash represents a solution of e-payments which consists of the interaction among three entities:

- the bank that issues the currency, validates the existent coins and changes the real coins for e-cash;

- the purchasers having accounts with the bank, from which they may load e-cash currency or where they can deposit e-cash currency;

- the sellers who accept e-cash currency in exchange for goods or services.

E-cash is implemented using the cryptography with public keys. Each user has its own pair of keys (public E and private D). E-cash management needs a special soft: for the clients a program called cyber wallet and for the seller a special program called e-cash.

Withdrawal of e-cash from the bank – consists in the fact that the software cyber wallet of the client calculates how many digital coins and of what values are necessary in order to satisfy the payment demand. Then the PC capitalizes at random number of series for these coins. These coins are valuable enough (100 of decimal figures) that the probability should be very small for someone to endanger the same value. These figures are made anonymous with the help of the blind signature technique. This is accomplished through multiplying them with the help of a random factor. This anonymous money is then packed in a message, digitally signed with the public key of the client, encrypted with the public key of the bank, then electronically sent to the bank.

When the bank receives the message, it checks the signature, and then the withdrawn sum may be paid from the client's account that signed the petition. The bank signs the e-coins with its private key, give them back to the client, encrypted with its public key.

By using the blind signature, the bank is prevented from recognizing the coins as coming from a certain account. Instead of creating white electronic coins, a user's PC is the one that creates the coins at random. Then these coins are sent to the bank. The bank withdraws at each reception dollars from the user's account and builds the digital validation of the currency as a seal on the envelope it has just mailed. The envelope thus sealed is then given him back. When the user's PC will remove the envelope, he will receive a digital coin, validated with the seal of the bank. But since the bank did not see the coin hid in the envelope, it cannot say where it is from – or whose the money is.

After the client receives the anonymous money signed by the bank, he deciphers the message by dividing it with the random factor. The digital coin that is to be withdrawn from the user's account in the bank will be deposited on the disk of his PC.

Spending the e-cash coins – when a client has the e-cash on his disk, he may purchase something from the virtual store. The payment petition is approved by the client by pushing the *Yes* button in the window. His cash program will choose from his wallet (on the disk) the suitable electronic coins to form the lump sum. After that he will erase these coins and send them back to the virtual store. When the program of the store receives the coins, sends them to the bank automatically. He then waits until the coins are accepted or dismissed, before it delivers the product to the client.

Net-Cash represents another example of electronic methods of payment on-line. It

was framed at the Science Institute at University of Southern California and represents an example of electronic system of payments. Though the money may be identified, Net-Cash offers means to ensure the payment a certain degree of anonymity. The system is based on more servers of distributed coins, which may be exchanged for electronic checks (including Net Check) in electronic currency. The CAFÉ system of the European Community is based on a wallet card. Though the system does not ensure complete confidentiality for the e-payments, Net-Cash offers other means to ensure a certain degree of confidentiality. The system is based on more servers of distributed coins which may be exchanged with electronic checks (including Net Check).

Net Cash system consists of the following entities: purchasers, sellers, coins servers (SM).

An organization that wants to manage a currency server will have to obtain an approval from a central authority of authentication. The currency server will engender a pair of RSA keys, both public and private. The public key is then authenticated through the signature of the central authority of authentication. This certificate contains an identifier (ID), the name of the currency server, the public key of the currency server, the issuing and expiring data, all signed by the central authority.

The electronic coins issued by the currency server consist in: name of the currency server, the address of the currency server, expiring data, serial number, value.

The currency server keeps the account of all the series of money issued by it. In this case the validity and double expense may be checked every time a purchase is performed or a check is exchanged. When the checking of money is performed, its series are erased from the data base and the money replaced with other series. An electronic check may be changed at a currency server with electronic money.

In order to ensure the confidentiality of payments, SM is not authorized to keep in mind the persons to whom it sends electronic money. The holder of such coins may then go to another SM to change them with others issued by SM.

Another type of systems is based on intelligent cards, having an incorporated chip in the plastic layer, bestowing to him processing properties, high memorization and security.

Smart cards may be used to implement new schemes, which allow ensuring security and risk diminishing for frauds. Techniques of authentication are used through cryptographic protocols, electronic signature etc. there are more solution which are already used: electronic wallet for small purchases (under 20USD); universal electronic wallet for future markets, confrontation with a high rate of inflation, lack of clients' solvability, with less using of the cards. The value included in the card is either pre-paid, or pre-authorized. This product may be utilized also for valuable purchases, because each transaction is preauthorized and pursued (recorded); the electronic passbook is an intelligent card associated to a bank account of the holder, which registers the transactions, calculates the balance and allows withdrawal of cash on-line (it is suitable where there is no corresponding national communication system). Whenever the card is used on-line (at the subsidiary of the bank in the local city, at a connected ATM), the last transaction and the balance are activated. When the client is not in a connected area, he may be informed about the new balance and may withdraw cash from ATM (Automatic Teller Machines) or a local subsidiary of the bank.

A system of payment based on electronic wallet has to have at disposal the following security components:

- the wallet containing the card identifier, an identifier for the issuing bank, to

allow the compensation and discount, balance, cryptographic keys for crediting the security of the re-loading, cryptographic keys for debit, for the security of the purchase, the maximum accepted balance, the record of the last transactions;

- the merchandiser card containing the secret keys with which POS authenticates the wallet, checks the extract of account with the current account and debits the balance of the wallet with the value of goods or services, as well as a pin for avoiding unauthorized using;

- EFTPOS (Electronic Fund Transfer at Point of Sale) is the electronic terminus for accepting the cards; at POS all the transactions are performed in secure electronic environment. Thus through the authorizing system, automatically it is confirmed that in the card account of the one who performs the payment there is the necessary money and the transaction is automatically performed. The owner of the card has to introduce the PIN code to validate the transaction. The advantages of utilizing POS are bilateral, both for the merchandiser and for the holder of the card. Thus the credit of the merchandiser is automatically credited with the sum corresponding to the transaction. Thus it is avoided the money manipulation, with all its disadvantages – personal and security. At the same time the client benefits from some advantages: gets rid of the inconvenient manipulation of cash – uncomfortable and risky, may also pay for the unplanned purchases, for which otherwise he could not pay.

- the collecting card, which collects the data referring to off-line transactions from the automatic disposer of products and e-cash, which can be downloaded at a center of on-line processing.

- ATM or other loading device of the wallet, which is connected on-line with the issuing bank where the secret keys are kept necessary to load the wallet. This scheme supposes that the payer should load virtual banknote and coins and then save them in his electronic wallet from an electronic bank and then save them in his electronic wallet on a smart card.

- Nonetheless there are systems of payment, where the wallet is situated on the payer's hard disk. As a consequence they may create: physical electronic wallets on electronic cards and virtual electronic wallet, as files disk containing electronic currency.

REFERENCES

1. Bob C., Vișean M., Felea M., Săseanu A. (2003) – *Informational Systems in the Commerce*, ASE Printing House, București;

2. Hinkelman E., (2000) - *International Payments*, Teora Printing House, București;

3. Ino Gh. Roșca și colaboratorii - *Electronic Commerce*, Economic Printing House, București;

4. Ion Roșu Hamyescu (2005) - *Treatise on International Transactions*, Vl. I,II, Universitaria Printing House, Craiova;

5. Luminița Pistol (2007) - *Techniques for Economic Commerce and Cooperation*, România Tomorrow Printing House, București.