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Electronic Payment Methods

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I. Introduction ➡

Traditional payment methods such as banking transfer, credit cards, against reimbursement, checks, orders of payment and money orders will not be the object of analysis in this work, because their operation is well known.

In this work will be analyzed the main payment methods that have arisen under the protection of the new technologies and mainly on the Internet.

The analysis of payment methods is divided in this work in two major epigraphs, one called "new payment methods" and the other called "electronic payment methods". This division is based on the existence of hardware, and causes heterogeneous payment methods to be grouped under the same epigraph. That implies that there are not too many similarities between grouped payments methods included in the same epigraph, and on the other hand, payment methods that present greater similarities are grouped in differents epigraphs. For example, smart cards and virtual credit cards have many similarities of use and structure but they are grouped in the same epigraph.

The new payment methods that have arisen in the Internet scope have, mainly, two objectives that are easy to observe at first sight. These objectives are, on the one hand, security, and on the other the protection of privacy. A third objective would be the wide acceptance of these payment methods on the part of the economic operators. Recently, we can observe that the E-cash model presents great advantages with respect to security and

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privacy objectives, but on the contrary, does not have a great diffusion, unlike credit cards. On the other hand, smart cards present a high level of security, but, the lack of an ample technological structure of "readers" of this kind of cards means that their use does not fulfill the security expectations.

II. New Payment Methods ➡

In this section, those payment methods are analyzed that have hardware and that therefore, can be used both in the physical world as well as on the Internet.

A. Point Of Sale at Home ➡

1. What is a Point Of Sale and how it is used?

   It is a system that offers the possibility of using credit cards through a point of sale (POS), in a similar way as it would be used in traditional commerce, but once the distributor gives the merchandise, this is a relation "delivery of direct merchandise-payment ", therefore there exist stores on-line that use this method to gain clients.

2. What advantages does the use of a POS at home offer?

   From my point of view, the advantage of this system consists of overcoming the fears that most people suffer at the time of using electronic commerce. They are:

   a. The fear to give a credit card number on the Internet.

   b. And, the fear that the merchandise will not be given by the salesman once he has the data of the credit card to make the charged to the customer´s account.

3. What disadvantages does the use of a POS at home offer?

   The disadvantages are mainly for the company that commercializes or distributes the merchandise. Either it must have an ample fleet for distribution that makes profitable the implantation of the system, or else it contracts with a parcel service that owns the system and makes the delivery of the merchandise.

4. What precautions must the user take?

   The clients, in these cases, must make sure of the authentication of the server and that their data travels through the network in encoded form.

B. Debit to the Internet Server Provider (ISP) or Telephone Company ➡

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1. What does the debit to the ISP or telephone company consist of?

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This system is conceived fundamentally for the accomplishment of purchases online so that the client will load the purchases to the invoice of his Internet Services Provider (ISP) and pay the same on the terms decided with its ISP.

2. What are the disadvantages to the system of a debit to the ISP or telephone company?

The disadvantage is mainly technological. The success of these systems will depend on software companies and the main companies of electronic payment agreing on a standard system called EMV, as well as the protocols of security SSL (Secure Socket Layer) and SETH (Secure Electronic Transaction).

C. Payments by Mobile Telephone ➡

1. How are payments by mobile telephone made [2] ?

Payments made under this system will use technology GPRS (General Packet Radio Service), WAP (Wireless Application Protocol) and UMTS (Universal Mobile Telecommunications Service), to turn mobile telephones into an Internet terminal from which we will make payments of the operations made on the Internet, as in the physical world, although mainly in the latter.

2. How does a mobile telephone payment work?

A store associated with the system makes a purchase request to the payment management center. The client, by the use of a code number, asks for a validation of the purchase to the payment management center. This center authorizes the transaction and sends a message to the store confirming the sale and a message to the client confirming the purchase. Later, from the client´s bank will be made a transference of funds to the payment management center, and the management center will send another transference to the bank of the seller.

3. What transaction can a user make?

The users of this system will be able to make transactions such as:

a. Consultation of balances of banking accounts.

b. To buy and to sell investment funds.

c. To buy cinema tickets, theatre tickets, etc.

d. To make reservations in different sport centers.

e. To buy tickets to take trains, airplanes, etc.

f. To buy any type of drink, tobacco, etc, that you do yourself in "VENDING" machines

g. Warnings of electronic mail with a notification by telephone.

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h.
Reading of e-mail by conversion text-voice.

i.
Answer mail by annexing a digitized voice file (Wav type) from the telephone.

j.
Buy-Sell share in the stock exchange.

k.
To operate with electronic banks.

l.
To reserve and to pay the invoice of hotels, restaurants, etc.

D. Smart Cards ➡

1.
What are smart cards?

They are those cards that have a microprocessor that controls the access to the information, have their own operating system of the emitter of the card and have functions of security against fraud.

At the present time software companies are working on the development of standard EMV for their later implantation in the chip installed in smart cards.

2.
Which are smart cards main applications?

Their main applications are in the "change purse" card or operations of high value as a result of the increase in the security that they provide.

3.
What advantages do smart cards offer?

The main advantage is the greater security not only in the encryption of the data stored in it, but also, in the need of a personal password whenever a transaction is made. This increases the security benefits both for the emitter of the card and the user, since the losses from fraud are reduced. If you do not use this kind of card with the corresponding "reader" you will be making an incorrect use of the card and the levels of security will be equal to conventional credit cards. When there is a processor integrated in the card, these have a capacity 80 times superior to conventional cards of magnetic strips. In addition, lately the price has diminished significantly , approximately from 15€ to 4€.

4.
What disadvantages does the use of smart cards offer?

The main disadvantage resides in the PC of the user. For its correct use, the card must be provided with a "reader" in which to insert the card, which supposes a disadvantage at the time of its correct use in e-comerce, because we do not know the cost of this "reader". A solution will be the manufacturer of computers that include this kind of "reader" by default to reduce prices. This lack of "readers" could curb the development of this payment method.

5.
What is the future of smart cards?

The implantation of these kind of cards can not be accelerated unless an important technological change takes place, because the main issuing card companies (Visa,

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Mastrcard, American Express) are making advertising campaigns for the popularization of this kind of cards for their use in the network. For example, American Express has sent the Blue Card American Express [3] that offers as benefit, in addition to the conventional cards the possibility of the postponement of payments, access to the account balance, guarantee in on-line purchases, return of 1% of its purchases, client service attention 24 hours, help anywhere in the world, etc.

III. Electronic Payment Methods ➡

In this section, we will analyze purely electronic payment methods that lack hardware, such as those that only can be used in the Internet environment.

A. Systems Based on Virtual Credit Cards ➡

[4]

1. What is a virtual credit card?

   This kind of card does not rely on any hardware, that is to say, they are solely a number lodged in the server of the emitting organization.

2. How is a virtual credit card used?

   This kind of card is used of the following way:

   The user will load the virtual card with a determined amount; this will be done through the Internet, automatic tellers or branch of a bank. This upload is made against any account that the user arranges in the issuing bank, one to make the purchase ofthe empty card and in case a loaded card has not been drained completely the rest could be "download" in the account that the user chooses.

3. What advantages does the use of the virtual credit cards offer?

   The main advantages offered by this kind of card are that they do not have to be necessarily associated to a certain account and also are free of the costs of discharge or maintenance. In addition, many financial organizations that commercialize this kind of card include an insurance against fraud in purchases made on the Internet.

B. The E-cash Model ➡

1. What is an E-cash model?

   This is a system that provides security and privacy through a scheme of cryptography with public keys, and validity as much for open networks (Internet) as for private networks. The system associates an application of software online that allows the accomplishment of payments in exchange for information, goods or services.

2. 2. How does the E-cash model work?

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Once the funds are bought from emitting organizations, the client uses the funds to pay a salesman. At the moment of the purchase, the salesman must resend the funds to the bank of issuance to make sure that those funds have still not been spent. If the funds are valid, they will be deposited in the account of the salesman. Then, the salesman can send the merchandise and the invoice corresponding to the client.

3.

3. What is the disadvantage to the use of the E-cash model?

The main problem of E-cash is that, unlike credit cards with a world-wide diffusion, it is necessary that the commercial establishment accept it as payment method. Another problem resides in that at the present time in the development of this model, the client and the salesman have to have accounts in the same bank of issue of the E-cash, that is at the moment the funds emitted by a bank are not valid in other banks. Nevertheless, it is possible that as the use of E-cash extends, there will appear organizations who are dedicated to the interchange of these new currencies between banks.

4.

4. What are the advantages the use of the E-cash model?

It offers the possibility of maintaining the absolute privacy of the client, provided there is an agreement between the bank of issue and the organization from which the goods or services have been acquired.

C. Systems Based on NetBill Checks5. ➡

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1.

What is the systems based on NetBill checks and how does it work?

This is a system that was developed by the University of Carnegie Mellon. Its operation is based on a protocol of transactions of NetBill and the use of symmetrical keys for the return of the acquired data.

This kind of transaction receives the name NetBill checks because its operation is similar to a payment with a check, so that the payment (and the transference of funds between accounts) are carried out at the moment in which the purchase is made.

So that the NetBill system can function, the clients and the commercial organizations must belong to the system supported by a server of NetBill, that is in charge of maintaining the accounts of the clients and those of the commercial organizations. These accounts can be associated with traditional accounts in financial organizations. When a client buys information, it loads the corresponding amount in its NetBill account, which is paid to the NetBill account of the commercial organization.

2.

2. What are the advantages of the use of the systems based on NetBill checks?

The advantages of this system are related to the possibility of paying solely by the received information.

3.

3. What are the disadvantages of the use of the systems based on NetBill checks?

Like the other systems analyzed previously, it has the disadvantage that the clients

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and the commercial organizations must belong to the system so that a transaction can be made.

IV. Legal Approach. ➡

In this epigraph we will introduce notes for orientation so that the businessman as consumer can anticipate the legal consequences of certain payment methods. For this reason we have made three groups with the different payment methods. In the first group are all those payment methods susceptible to be compared with a conventional credit card. The second group gathers the E-cash model and the NetBill checks. Finally, the third group include those payment methods that are made through the mobile phone or internet service provider.

The first group is made up of the POS, smart cards and virtual credit cards. In the first place we want to clarify that the POS is not exactly a payment method, but that its system that allows us to use our credit cards to make certain purchases on-line, therefore is assimilated to credit cards. We observed that at the moment, most of the consumers who make purchases on Internet use credit cards with magnetic stripes or " Chips ", but a specific legislative framework does not exist that protects them. This does not mean that the user is unprotected but rather there will be applied all the rules referring to conventional credit cards.

The second group is what we could call electronic money. Leaving the problems derived from the currency issuance apart, the power of the central banks of each country, except in the European Union for whom this capacity has been transferred by the states to the European Central Bank, we find that the contract subscribed between clients, businessmen as consumers, and the emitting organizations is an atypical contract, that is to say, that contract for which does not exist a specific regulation. Therefore it will be necessary to be flexible with the conditions gathered in the transaction contract of this kind of currencies.

Finally, in the third group we find those based on a contract of telecommunications services. For that reason, in the same form that the user responsible for telephone calls made with his terminal will be, in principle, the person responsible for the payments made with that terminal, because he has the obligation to keep in secret the codes that allow access to that terminal.

Once we have made these considerations, we will see some of the limits and guarantees of the European tax directives on this matter.

The directive relative to emitting organizations of electronic money [6] sets down in its article 7 that the emitting organizations "will have to respond to the financial and non financial risks to which these organizations are exposed, including the technical risks and risk of procedure"

Directive 2000/31 [7] in its chapter II section 3 sets down the principle of functional equivalence [8] . The same principle can be observed in Section 5.1 [9] of Directive 1999/93 [10] on electronic signature.

Directive 1999/93 in Section 6.1 [11] establishes the responsibility of the service of certification for the damages caused, whenever these damages are a consequence of the confidence deposited in an issued certificate. There are exceptions, like the possibility of establishing a maximum limit of the value of the transaction.

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Directive 97/7 [12] sets down a catalogue of rights and guarantees for the sales made at a distance; obviously, electronic contracting is one more of the possibilities of contracting at distance that exist. In this catalogue is collected the right of rescission [13] . Section 8 guarantees that the consumer will not undergo damage by the fraudulent use of his credit card [14] . In addition, this directive establishes in its Section 12 the imperative character of these dispositions, which implies that they are not susceptible of negotiation or alteration in a contract by use of the autonomy of will that the contractors have [15] .

V. Security Protocols ➡

Finally, we will briefly analyze the main security protocols used to guarantee the security and the privacy that helps the transactions made on Internet to reach a satisfactory conclusion.

A. SSL Protocol (Secure Socket Layer) ➡

[16]

This protocol was developed specifically for the data transmission through the Internet. Its technology is based on the encryption of the data of the user.

This system centers the risk and the responsibility of transactions on the retailer. The system is based on the introduction in the Internet navigator of a protocol "SSL". This sends the encrypted information to the Web server in which the virtual store of the supplier of services is hosted. The supplier of services to programs its server so that this demands the encryption of the data when it receives sensitive information, such as the personal number of the credit card, personal data, etc.

Of this form, the service provider has for handling this information, since it receives the information in an encrypted form and is the one that had to decode it.

B. Protocol SET(Secure Electronic Transaction) ➡

[17]

This protocol is of transactional character. It is the model that is proposed by the emitting companies of Visa and MasterCard. Its intention is to guarantee a safe electronic transaction and to assure to authenticate the identity of the user in any kind of network including Internet.

The system is based on the emission of a digital certificate administered by specialized organizations so that an absolute control of all the monetary operations on the Internet can be established. Of this form, all those people or companies that wish to conduct monetary operations in the environment of the Internet will have to install in their computer a digital certificate that credits its authenticity and in addition that relates it to the banking accounts in which the instalments and the resulting outcomes of the conducted transaction will be made.

The organizations in charge of the emission of these certificates would denominate "certification organizations" and they would be in charge of verifying the authenticity of certificates and to authorize the requested transactions under the protection of such certificates.

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As a counterpart to the high level of reliability of the system, there is the resulting problem of the emission of millions of digital certificates and the risk of the concentration of these certificates into the hands of few organizations. Specifically these risks are based fundamentally on two aspects:

The possible violation of the right of privacy of the users, in relation to their economic activities.

The growth and control of the new business that would be the intermediation in the totality of the monetary operations conducted in the environment of the Internet by these companies.

VI. Conclusions ➡

E-comerce has its main link in its development on-line in the use of payment methods, some of which we have analyzed in this work. The risks to the use of e-comerce are identity theft and theft of payment data, and fraudulent rejection on the part of consumers.

Therefore, and until the use of the electronic signature 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 payment methods that have been analyzed 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 the others. It is therefore up to the businessman to choose some of them, depending on the goods that they sell. For example, if the clients want to maintain their privacy, the businessman will have to choose to offer payment methods that guarantee a higher level of privacy, such as E-cash and NetBill checks. If the priority is security, we will want to use, among others, Smart Cards.

In the case of sales to minors who needs delivery at the address of the client, and as long as the volume of business is great enough, we will be able to use the POS at home.

For that reason, the businessman will have to make an exhaustive study of the market that allows him to know who is his target market, because this way he will know the reluctance and fears that can be involved in a purchase on-line. Depending on the market, he will be able to use systems that although more complex, offer more guarantees than in markets with a smaller technological culture. Studies have demonstrated that the time that a client spends in making a payment is limited. For these reasons the best strategy is a good knowledge of your customers and your products.

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E-links

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http://www.visa.com/

http://www.mastercard.com/

http://www.americanexpress.com/

http://www.movilpago.com/

http://www.paybox.es/

http://www.lacaixa.es/

http://www.sermepa.es/

http://www.geocities.com/CapeCanaveral/2566/ssl/ssl.html

http://www.geocities.com/CapeCanaveral/2566/set/set1.html

1: Mercados electrónicos nuevos sistemas de pago. Diego Gómez Cáceres, Luis Corbalán Sánchez de Las Matas. Editorial ESIC Madrid 2001. ➡

2: For further, information a including video-demo, please visit: http://www.movilpago.com/ http://www.paybox.es/ http://www.lacaixa.es/ ➡

3: For more information about this card visit: http://www.americanexpress.com/ ➡

4: Information get from: http://www.sermepa.es/ ➡

5: Sistemas de pago. Alfredo Lozano, José Manuel agudo. http://www.icemd.com/ ➡

6: Directive 2000/46/EC of the European Parliament and of the Council of 18 September 2000 on the taking up, pursuit of and prudential supervision of the business of electronic money institutions. Official Journal L 275 , 27/10/2000 P. 0039 - 0043 ➡

7: Directive 2000/31 of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce). Official Journal L 178 , 17/07/2000 P. 0001 - 0016 ➡

8: The legal function that in all its extension possibly ensure the instrumentation written and autograph - or its oral expression- respect to any legal transaction ensure also its electronic instrumentation through a message of data, independently of the content, dimension, reaches and purpose of the act thus orchestrated. ➡

9: "1. The States members will try that the electronic company/signature outpost based on a recognized certificate and created by a safe device of company/signature creation in the same way satisfies the legal requirement with a company/signature in relation to the data in electronic form that a written by hand company/signature satisfies requisite sayings in relation to the data in paper; and he is permissible like test in judicial procedures." ➡

10: Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures. Official Journal L 013 , 19/01/2000 P. 0012 - 0020 ➡

11: "1. - The States members will guarantee, like minimum, that the supplier of services of certification that issues to the public a certificate presented like recognized certificate or that the public so certified guarantees, he will be responsible by the damage caused to any organization or physical or legal person that trusts the certificate reasonably." ➡

12: Directive 97/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts. Official Journal L 144 , 04/06/1997 P. 0019 - 0027 ➡

13: "With respect to all negotiated contract, the consumer will have a minimum term of seven days workable to terminate the contract without penalty some and indication of the reasons. The only cost that could be imputed to the consumer is the direct cost of the return of the merchandise to the supplier." ➡

14: "The States members will guard so that appropriate measures exist so that: - the consumer can within the framework ask for the cancellation of a payment in case of fraudulent use of his card of contract payment at a

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distance covered hereby Director; - in case of fraudulent use, the sums paid for payment are paid in account to the consumer or they restitute) ➡

15: 1. The consumers will not be able to resign to the rights that are recognized to them by virtue of the transposition the national Right of the present Directive. 2. The States members will adopt the necessary measures so that the consumer is not private of the protection that the present Directive by the election of the Right of a country third like Right applicable to the contract grants, when the contract presents a narrow bond with the territory of one or more States members." ➡

16: Information get from: http://www.geocities.com/CapeCanaveral/2566/ssl/ssl.html ➡

17: For more details see: http://www.geocities.com/CapeCanaveral/2566/set/set1.html ➡

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