Title: SYSTEM AND METHOD FOR DISTRIBUTED CLEARING OF ELECTRONIC PAYMENTS

Abstract: A system and method for providing electronic clearing of electronic buy-sell transactions in which the trust function is distributed among the banks of the transaction parties and payment is cleared through an electronic clearing bank that aggregates and nets credits of those banks. A buyer at node (10) has an e-credit line with a local bank (30). A seller at node (20) has an e-credit line with a local bank (40). An electronic marketplace (50) is provided for buy-sell transactions. An electronic clearinghouse (60) mediates electronic transactions between the buyer’s bank (30) and seller’s bank (40).
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
SYSTEM AND METHOD FOR DISTRIBUTED CLEARING OF ELECTRONIC PAYMENTS

FIELD OF THE INVENTION

This invention relates generally to providing secure clearing of electronic payments for a broad range of electronic transactions.

BACKGROUND OF THE INVENTION

Internet technology is making sweeping changes in global communications and how business is conducted. The electronic Business-to-Business ("e-B2B") and Business-to-Consumer ("e-B2C") marketplaces are the building stones of the new Internet economy. Although the technology is still in its infancy, it is growing rapidly. In particular, the Internet's potential for providing communications and payments more conveniently and less expensively is attracting corporations, as both payers and payees, as both buyers and sellers. Yet the pace of this growth is tempered by genuine concern that there are no trusted and secure electronic payment mechanisms covering the entire purchase-sale process. Among the major challenges facing electronic commerce are the need for inexpensive and timely payment mechanisms and the perceived security risks and lack of reliability that the Internet introduces.

There are a number of currently available or emerging payment systems designed to provide payment transactions over the Internet. These may be divided into two main categories: payment systems that are similar to payment instructions and payment systems that are more like digital money transfers.

In the first category are mechanisms such as the Financial Services Technology Consortium’s ("FSTC’s") Bank Internet Payment System ("BIPS"), FSTC's Electronic Check ("e-Check") Initiative, Open Financial Exchange ("OFX"), Financial Electronic Data Interchange ("FEDI"), and credit card networks such as Visa and MasterCard. These systems tend to leverage existing payment infrastructures and methods (such as the Automated Clearing House ("ACH") and the credit card network).
BIPS was a project initiated by the FSTC in 1998. It provides a protocol allowing banks and their customers to conduct secure financial transactions over the Internet, connecting current bank payment mechanisms to Internet users. When a customer sends a payment request instruction to a bank, his request will be authenticated and processed through the existing payment processing systems.

E-Check is a new payment instrument aimed at combining the security, speed and processing efficiencies of all-electronic transactions with the familiar and well-developed legal infrastructure and business processes associated with paper checks. To make a payment the check writer "writes" the e-Check using one of many types of electronic devices and "gives" the e-Check to the payee electronically. The payee "deposits" the electronic check, receives credit, and the payee's bank "clears" the e-Check to the paying bank. The paying bank then validates the e-Check and "charges" the check writer's account for the check. The legal infrastructure for widespread acceptance of these checks is still being developed, as issues of electronic "negotiability" remain.

OFX is a unified specification for the electronic exchange of financial data between financial institutions, business and consumers via the Internet, created by CheckFree, Inuit and Microsoft in 1997. It supports a wide range of financial activities including consumer and small business banking, consumer and small business bill payment, bill presentment and investments including stocks, bonds and mutual funds. By supporting transactional Web sites, thin clients and personal financial software, it claims to streamline the process financial institutions need to connect to multiple customer interfaces, processors and systems integrators.

FEDI is a method of exchanging information between banks and their corporate customers' computer applications in a standardized form, enabling them to send and receive electronic payments the same way purchase orders, invoices and other 'routine business documents are exchanged through ordinary Electronic Data Interchange ("EDI").
Use of credit cards in electronic commerce leave vulnerabilities that have been addressed only in part. Often in telephonic transactions, the only means for assuring that a purchaser using a credit card is in fact the authorized holder of the card is to allow shipment of goods only to the credit card billing address.

The Secure Sockets Layer ("SSL") protocol, used by most e-commerce servers, offers "session-level" security. This means that once a secure session is established, all communication over the Internet is encrypted. It is designed to protect the capture of credit card account numbers by others on the Internet. However, once the information has reached the merchant and has been decrypted, it is the responsibility of the merchant to store this confidential information in a secure format. Hence, the user has no control over the security of their information once it has reached its destination.

The Secure Electronic Transactions ("SET") protocol, developed by Visa and MasterCard, was designed to allow the cardholder to send secure payment instructions over open networks and obtain authorization information. It uses both SSL techniques and digital signatures using public key encryption and adds confidence to the payment process by ensuring that merchants are authorized acceptors of the credit card, thereby eliminating a whole category of merchant fraud, and by ensuring that the purchaser is an authorized user of the credit card. This protocol has not been widely used because it remains unwieldy relative to consumer reliance, at least in the United States, on legal limitations on consumer liability for credit card fraud.

The SET protocol is also an example of a certification system in which digitally signed certificates are used to ensure that the person associated with a provide signature key is trustworthy. At least two major problems exist with respect to these digital signature/certificate trust-chains: (1) no matter how certainly a digitally signed record is associated with the holder of the private signature key, there is no similar assurance that a different person has acquired
that key; and (2) the "root" certificate authority has an
enormously leveraged responsibility - translated into
liability - leading to market uncertainty as to pricing of
such services.

The second category of payment systems empowers consumers
or businesses to take possession of electronic money and store
it on a card or piece of hardware ("cyberwallets") before
transferring electronic cash over the Internet. Examples are
Smart Cards such as Mondex or EMV, and electronic cash systems
like ECash, Millicent, WorldPay, or Cybercoin. These devices
share the characteristic of simulating legal tender, which can
be traded on a distributed basis, providing user privacy
relative to centralized systems such as credit cards.

Europay, MasterCard, and Visa (EMV) developed The
Integrated Circuit Card (ICC) Specification for Payment
Systems in 1996. It describes the minimum functionality
required of integrated circuit cards (ICCs) and terminals to
ensure correct operation and interoperability on a global
basis, regardless of the manufacturer, the financial
institution, or where the card is used. It is a set of global
specifications for credit and debit applications employing
smart card technology. These specifications provide the
framework for moving debit and credit cards from magnetic
stripe to chip technology to reduce fraud and improve
management of credit risk.

Mondex, controlled by MasterCard, uses a smart card to
store electronic cash, which can be used to pay for goods and
services in the same way as cash. Funds are stored remotely on
the user's actual card, each of which is certified by a Mondex
digital signature. The system is unique in that it can
accommodate card-to-card transfers. When a transfer occurs
between a consumer and a merchant, the two cards first verify
each other's authenticity. If both are authentic, the transfer
between the two cards is sequentially processed. This means
that funds are deducted from the consumer's card before they
are written to the merchant's card. The system requires each
e-market participant to own a Mondex card.
Visa Cash, a bearer certificate product from Visa, is chip card-based. A microchip embedded in each plastic card stores monetary value. It is designed to be a new way to pay for everyday necessities without having to carry around a pocket full of change. It can be used for small purchases such as a cup of coffee, newspaper, pay phones, and cinema tickets and alike, in the real world as well as on the Internet. Each time Visa Cash is used, the purchase amount is automatically deducted from the balance. In part because it does not provide for card-to-card transfers - and hence, transaction fees - banks have not been motivated to support this product.

E-Cash is digital coinage for on-line transactions developed by Digicash. Using the e-Cash client software, a customer withdraws e-cash from a bank and stores it on his computer. The client software is called a "cyberwallet" and is responsible for withdrawing and depositing coins from a bank and for paying and receiving coins from a merchant. Consumer privacy is the cornerstone of the e-Cash model.

Digicash believes that the issuing bank should not necessarily know which customers receive which digital tokens. Therefore the customer himself has to create blank tokens, using his electronic purse software, and forward them to the bank for certification. The bank then stamps a signature on each coin, debits the client's account and e-mails the tokens back over the Internet.

MilliCent is an Internet payment system for small-scale commercial transactions. It is optimized for buying and selling digital products, like newsletters, real-time data feeds, MP3 music and software, over the Internet. The MilliCent Wallet uses electronic tokens called scrip that can be spent on the Web. Scrip is kept safely on the user's local computer storage and protected by a personal identification number or password. Payments can be made in two ways: one can "pay-per-click" to buy digital products below credit card transaction floors, or one can open a subscription that allows unrestricted access.
WorldPay is a secure multi-currency electronic payment system. The shopper has to open a WorldAccount by making a payment from their credit or debit card. WorldPay handles the micro-payments over the Internet by transferring funds from the customer's account to the merchant's WorldPay bank account. Unused funds can be returned any time to the original credit or debit card used to fund the WorldAccount.

Cybercoin, developed in 1996 by CyberCash, relies on a notational system rather than a bearer certificate model. As with any other digital cash scheme, the consumer has to prepay in order to get CyberCoins. A key difference between CyberCoin and other models is that the value of these Cybercoins is not transferred to the consumer's PC or chip card, but is held in escrow in a proxy account set aside for that consumer at CyberCash's bank in Virginia. When the consumer makes a transaction with a merchant, CyberCoins are transferred from the consumer's CyberCash Wallet to the merchant's CashRegister, using CyberCash as the central processor for the transaction. Basically CyberCash only keeps track of which consumer is paying which merchant and in what amount. The system's surplus value is based on the fact that each transaction doesn't require inter-bank clearing and settlement, which allows CyberCash to accommodate low dollar transactions cost-effectively.

While providing privacy relative to centralized systems, electronic payment systems using digital cash as means of payment include at least one major risk. Since e-money is embodied in digital form (as specific sequences of bits) and its creation completely software-based, an item of e-money is easy to duplicate perfectly. Because the copy is indistinguishable from the original, a trivial e-money system would allow a consumer to copy a piece of e-money and spend both copies. "Real world anchors" such as a physical smart card with encrypted access are required to avoid that situation. However, particular "real world anchors" do not work globally: a stream of bits purporting to be case received on an open network such as the Internet does not inspire much confidence unless it is supported by verification mechanisms.
The fact that each and every e-token the merchant receives has to be verified on-line severely limits the application of digital money.

All these existing electronic payment systems offer solutions that solve certain problems for certain situations in certain countries. However, no single "global answer" has been provided hitherto for electronic payment across the broad range of situations addressed by the traditional payment vehicle of the common "check" or draft on an account in a traditional bank.

A major problem in the existing electronic payment systems using digital money is the necessity of commitment from the Internet consumer and the merchant to a new financial service provider. In order to be able to send or receive financial transfers, both payer and payee must open an account, cyberwallet, or a similar product linking them permanently to the virtual financial service provider. In other words, the new financial service provider has sought to replace traditional banks. The question if those new products can be trusted remains unanswered.

The current growth of electronic commerce is tempered by genuine concern that there are no secure electronic payment mechanisms - this concern is directed both towards the possibility of fraud as well as invasion of financial privacy. Although secure transmission of financial data over the Internet is provided in most of the systems discussed above, there remains a significant issue as to the disposition of the information once it reaches its destination. In the traditional bank-based payment system, even if records of drafts are kept at intermediate banks, the banks generally are regulated - and trusted - and copies of the drafts do not pose a significant risk of fraud. In contrast, where new and currently largely unregulated electronic financial service firms are involved with perfect copies of transmissions, there is significantly less confidence among users.

Although the Internet today is used more and more for commerce, most of the existing electronic payment systems only offer credit card or digital money transactions and are
primarily addressed to low-dollar purchases and not the high-dollar and high-volume transactions of many businesses. Businesses do not enjoy the credit card fraud protection that consumers do in the United States and make good targets for Internet fraud. Again, even in the best of digital signature/certification systems, there remain the issues of how the trustworthiness of a "root certification authority" authority is established and priced. At least in part for these reasons, many e-B2B transactions involve basic introductions and negotiations on-line, but traditional manual payment and closing of transactions. As the volume and size range of transactions increase on the Internet, there is a need for a scalable and secure electronic payment system.

It is an object of the invention to address these requirements and overcome the gaps of the existing payment mechanisms by developing a process that allows businesses, consumers, banks and e-commerce marketplaces (websites) to conduct secure financial transactions over the Internet using a globally consistent system.

**SUMMARY OF THE INVENTION**

The solution provided by the invention is to distribute trust decisions in electronic commerce, including identity verification (authentication) and credit checking, to the entities traditionally most qualified to make such judgments on a commercial basis - the banks that already have relationship with the parties - and to aggregate transaction posting locally to avoid network congestion. An "e-credit line" is established for a customer at its "local" bank in a "physical" account like a traditional cash credit line, with the local bank's judgment applied to traditional risk factors plus developing experience with electronic commerce plus market conditions to determine the size and pricing of the account and transactions. An "e-clearing bank" is provided in which groups of local banks may channel communications among themselves and with electronic marketplaces concerning transaction verification as well settlement and clearing of payments through "bank e-credit lines" at the "e-clearing
bank" which aggregate bank client e-credit lines. With just a few transactions per day, local banks may achieve significant savings by “netting” transactions among e-credit lines of its own customers and actually transferring cash in or out periodically (for example once per day) according to the “netting” of its aggregate e-credit lines tracked at the e-clearing bank and transferred through the e-clearing bank or through traditional channels.

By placing the financial trust decisions exactly where they have been for generations - in the banks of the parties - the invention has the advantage of providing a higher level of confidence, trust, and affordability for businesses and consumers than can be achieved through the new financial service firms. This also allows a more accurate allocation of risk to the buyer through its bank, which is presumed knowledgeable about its credit history and financial health. On the other hand, it allows buyers to shop for better deals with other banks, allowing market forces to do their work.

The invention also has the advantage of maximizing security and privacy by minimizing transmission and possession of financial information. Parties may avoid the exchange of financial data over the Internet - even between themselves. The invention enables transaction parties to keep their financial information where it has been provided traditionally: at its bank.

Electronic marketplaces are also benefited by the invention. They are relieved of the burden of verification and of handling financial information about the parties, both of which involve additional operating costs and exposure to liability. The invention allows the marketplaces to focus on their primary mission: to match transaction parties and facilitate formation of contracts.

The invention provides local banks the substantial advantage of new relevance and the opportunity to become central players in electronic commerce at the relatively low cost of establishing e-credit lines for its customers and establishing the clearing arrangement here disclosed.
The invention has the advantage of immediacy. The "real world anchor" required for much of electronic commerce - otherwise provided by deliveries to billing addresses and expensive "out of band" verifications -- is already there in the existing banking relationships and simply needs to be tapped according to the invention.

Because banks already operate on a "24/7" basis electronically with more reliability than most electronic marketplaces, the invention provides far better scalability than the largely ad hoc and narrow solutions recited in the background discussion.

The invention has the further advantage of avoiding multitudinous direct transfers of funds in favor of periodic netting and clearing of accounts channeled through the existing secure network of banks. It also allows more complex payment options that banks can handle more readily than electronic marketplaces.

The present invention together with the above and other advantages may best be understood from the following detailed description of the embodiments of the invention illustrated in the drawings, wherein:

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a diagram of the components of the preferred embodiment of the invention.

Figure 2 shows a starting state of the preferred embodiment with a seller and buyer associated with each of two banks.

Figure 3 shows the state of the preferred embodiment in which a buyer associated with a first bank engages in an electronic buy-sell transaction with a seller associated with a second bank.

Figure 4 shows the state of the preferred embodiment in which the transaction of Figure 3 has been confirmed by the local banks.

Figure 5 shows the state of the preferred embodiment in which a buyer associated with the second bank engages in an
electronic buy-sell transaction with a seller associated with the first bank.

Figure 6 shows the state of the preferred embodiment in which the transaction of Figure 5 has been confirmed by the local banks.

Figure 7 shows the state of the preferred embodiment in a final clearing of the aggregate transactions.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

In the preferred embodiment of the invention, an “e-credit line” is established by an electronic commerce participant with a traditional bank, typically the “local” bank (which may not be geographically proximate) with which it has done business and which knows its business. The acceptance of an e-credit line by a client is a payment commitment of the client. Since this e-credit is a commitment of the local bank to pay this amount at any time, the local bank might charge a reservation or maintenance fee for this e-credit line.

These e-credit lines are not disclosed to anyone else in the system of the preferred embodiment of the invention. In order to proceed to financial transactions on the Internet, the local bank will act as a representative of its clients, as it does in the traditional payment system. It will be the client’s local bank that will check the identity of its client signing the purchase or sales contract and giving the payment instruction and that will execute the physical transfer of the funds.

Figure 1 shows the components of the preferred embodiment of the invention. A buyer node 10 is associated with a "local" bank 30, that is, the buying party at node 10 has an e-credit line with and is known to local bank 30, which may or may not be geographically proximate to buyer 10. A seller node 20 is associated with a local bank 40. An electronic marketplace 50 is provided for buy-sell transactions between buyer 10 and seller 20, although direct transactions between buyer 10 and seller 20 are possible, and it should be understood here that the electronic marketplace 50 may be a
specialized B2B site with the a limited number of parties, even as few as two. An electronic clearinghouse or "e-clearing bank" 60 mediates electronic transactions between local bank 30 and local bank 40.

Figure 2 shows a starting state of the preferred embodiment with a buyer 10 and seller 11 associated with local bank 30 and a buyer 20 and seller 21 associated with local bank 40 banks. Based on their relationships, local bank 30 has extended buyer 10 "e-credit" line of US$500 and seller 11 e-credit line of US$400 for an aggregate e-credit line of US$900 tracked reflected at e-clearing bank 60 as the aggregate "bank e-credit line". Based on their relationships, local bank 40 has extended seller 20 an e-credit line of US$300 and buyer 21 an e-credit line of US$800 for an aggregate e-credit line of US$1100 also tracked at e-clearing bank 60 as the aggregate bank e-credit line. As explained in its operation below, the aggregate bank e-credit lines serve as temporary references to allow clearing at the end of the clearing period, typically twenty-four hours.

Figure 3 shows a buy-sell transaction in the preferred embodiment. Buyer 10 and seller 20 meet in electronic marketplace 50 and agree in a "hand shake" to a sale for US$100 in a record (contract document) 512 that is authenticated (signed) by each party, for example, by their digital signatures. The record may be provided by the electronic marketplace upon a "click" on a screen opening an identification-authentication page that provides a procedure to apply a digital signature known to the party’s local bank to identify the party. The physical connection of the parties to the site (or to each other), which typically will involve a secure connection such as SSL, may be called "signature lines" 15 and 25.

The contract formed between the buyer and a seller typically will be for the purchase/sale of goods or services and may be in standard form. A B2B deal may generate a file on the B2B site that will be updated while the deal is still open. This file will basically hold the following data:

- Buyer’s identity
• Seller’s identity
• B2B-site reference
• B2B-deal reference
• amount and currency of the B2B deal

Depending on the negotiations between buyer and seller several terms will be attached to this file:
• payment terms
• general terms
• documents to be provided
• requested (financial) guarantees

In some cases, e-credit lines may be disclosed if the parties so agree.

If the deal is concluded, the authenticated contract document is forwarded on secure transfer line 56 to the clearing bank 60. (In a B2B transaction, transaction updates, such as a payment due in a multiple payment transaction, may also be so communicated.) Clearing bank 60 sends copies of the authenticated contract document to each of local bank 30 and local bank 40 on secure bank lines 63 and 64 respectively (which may be updated for open B2B transactions) for verification of the authentication (signature) of buyer 10 and seller 20 respectively. Local bank 30 verifies (and "authenticates") the signature of buyer 10, by comparing the signature (in the case of digital signatures, the encrypted hash results) against information on file with local bank 30 (in the case of digital signatures, the public key corresponding to buyer’s private key applied to decrypt the encrypted has results) and checks whether executing the payment instructions would exceed the e-credit line of buyer 10. Local bank 40 verifies the signature of seller 20.

Dashed lines 13 and 24 indicate inherent (historical) or optional out-of-band communications between local banks 30 and 40 and their respective clients buyer 10 and seller 11 and seller 20 and buyer 21. For example, local bank 30 may send an e-mail over line 13 to its client buyer 10 that advises of the blocking of its e-credit line. In addition, buyer 10 may be required to confirm the e-mail to local bank 30 and only when that is done would local bank 30 confirm the deal to the
e-clearing bank 60. Yet another security feature might be the transmission from electronic marketplace 50 to buyer 10 and to bank 30 of a secured unique deal reference and a requirement that local bank 30 request and obtain over line 13 confirmation of the deal by provision of a unique deal reference matching the one by the bank. These additional measures slow the transaction, but may be provided as premium services. In general, however, no real time direct transmission of information is required between the local banks and their clients, and no financial information about the clients need be transmitted during between the striking of the deal and the closing of the transaction.

Figure 4 shows the electronic confirmation of the buy-sell transaction. Local bank 30 has verified the identity of buyer 10 using its (digital) signature on file and has found its e-credit line sufficient to complete the transaction and has confirmed the transaction to e-clearing bank 60. At the same time, local bank 40 has verified the identity of seller 20 and will accept incoming transfers and has confirmed the transaction to e-clearing bank 60. E-clearing bank 60 confirms the deal to electronic marketplace 50, which in turn confirms to buyer 10 and seller 20. E-clearing bank 60 adjusts the bank e-credit lines of local bank 30 and 40 to US$800 and US$1200 respectively, in accordance with the payment instructions' effect on the aggregate e-credit lines. (In this example, there is payment without meeting further conditions such as shipment of goods, otherwise the adjustment will reflect only payment due; in cases of multiple payments, subsequent meeting of conditions may be determined at electronic marketplace 50 and uploaded as a transaction update. In some implementations, adjustment of the bank e-credit lines at e-clearing bank 60 may await instruction from the marketplace 50 after confirmation, that is, a B2B site may wait for approval through e-clearing bank 60 before executing payment instructions.)

The local banks independently adjust the e-credit lines of their clients according to their customer agreements, which may call for posting prior to confirmation to e-clearing bank
60 or at a settlement at the end of the day, but typically will block or lower an e-credit line of the buyer (payer) for the full amount of the “hand-shake” to avoid over-commitment in subsequent transactions. In some cases, the seller may be credited with some pre-payments even if the seller had not yet performed. In this example, local bank 30 reduced the e-credit line of buyer 10 by US$100, but local bank 40 has not yet increased the e-credit line of seller 20 by US$100 at the time of their confirmation of the deal to e-clearing bank 60 (and its concomitant adjustment of the bank e-credit lines.

Figure 5 shows a buy-sell transaction going in the reverse direction relative to the local banks 30 and 40. Buyer 21 and seller 11 meet on electronic marketplace 50 (which may be a different marketplace, or may be a direct transaction) and sign a contract 521 for a sale for US$150. Marketplace 50 sends the signed contract to the e-clearing bank 60. The e-clearing bank 60 forwards copies of the contract to local banks 30 and 40 for verification of the authentication of seller 11 and buyer 21 respectively. Local bank 30 verifies the signature of seller 11, and local bank 40 verifies the signature of buyer 21 and checks its e-credit line.

Figure 6 shows the electronic confirmation of the second transaction. Local bank 30 has verified the identity of seller 11 and will accept incoming transfers and has confirmed this to e-clearing bank 60. Local bank 40 has verified the identity of buyer 21 and found adequate its e-credit line and has confirmed this to e-clearing bank 60. E-clearing bank 60 has adjusted the bank e-credit lines accordingly. Local bank 40 has deducted US$150 from the e-credit line of buyer 21, but local bank 30 has not yet added US$150 to the account of seller 11 at the time of the confirmation of the transaction to e-clearing bank 60.

Figure 7 shows the final settlement or clearance through “netting out” of the transactions, which may occur at the end of the day. The e-clearing bank 60 compares the aggregated bank e-credit line of local bank 30, which e-clearing bank 60 has tracked, to its original position: US$950-US$900-US$50.
Local bank 30 then receives a transfer 63' of US$50 from e-clearing bank 60 using, for example, traditional wire transfer. At the same time, the e-clearing bank 60 compares the aggregated bank e-credit line of local bank 40 to its original position: US$1050-US$1100=(US$50). Local bank 40 transfers 46' US$50 to e-clearing bank 60. This is the only time during the day that money is transferred "physically". According to their separate agreement, local bank 30 increases by US$150 the account of seller 11, consisting of the US$50 local bank 30 has received from e-clearing bank 60 and the US$100 it has deducted from the e-credit line of buyer 10. Local bank 40 deposits US$100 into the account of seller 20, which remained after reducing the e-credit line of buyer 21 by US$150 and transferring US$50 to e-clearing bank 60.

In light of the foregoing, the following example shows how the invention can achieve savings from the relative high cost related to the existing electronic payment systems, approximately 3% on the margin of seller when paid with traditional credit cards. Assume a B2B-deal between a buyer and a seller that will take about ten days before it can be considered as executed (production time and shipping time), and assume that the e-credit the buyer has against his bank has a cost of 1.5% on a monthly basis (thirty days), which is a high margin product for the bank. By the nature of the above-described process flow, the buyer's e-credit will be blocked (or lowered) in real time when it "shakes hands" with the seller. If the buyer only wants to restore its e-credit line when it has received the goods (settlement ten days after the "handshake" and adjustment of the bank e-credit lines), the cost will be 10/30 * 1.5% = 0.5%, which is already much lower than the credit card costs, and the cost is supported by the customer and not by the seller. If the bank decides only to charge the usage cost of e-credit and only once a month, there will be no direct link between the transaction and the related cost. In the same example, the seller might negotiate with its bank to get an advance payment (advance on invoice) since the (future) payment is confirmed.
Other implementations are possible without departing from the basis of the invention. For example, although the examples are for the Internet, other forms of electronic information exchange may be substituted in whole or in part. The local bank may be any financial institution that has special knowledge of the transaction party. In the case of very small, "micro" transactions, a virtual local bank may aggregate many transactions until the end of the day when settlement occurs. The invention may also be implemented through direct party interaction and provision of a standard digitally signed contract to the e-clearing bank, and there may be several e-clearing banks with connections between them. Moreover, other forms of dedicated accounts may be used in place of, or mixed with, the e-credit line, including, for example "guarantees". Different forms and mixes of secure connections and signatures, including biometrics, may be applied.
What is claimed is:

1. A process for settling payments by a buyer in an electronic purchase-sale transaction comprising the steps of:
   a) establishing a customer dedicated account at a local bank for said buyer, said step comprising (i) establishing a limit for charges against said customer dedicated account; and (ii) providing at said local bank identifying information to be compared against an electronic signature to verify whether said buyer made the electronic signature;
   b) electronically communicating in real time to said local bank a record of said transaction electronically signed by said buyer with instructions to pay;
   c) in real time by said local bank, (i) comparing said electronically signed record with said identifying information to verify that said buyer made the electronic signature; (ii) verifying that payment according to said instructions would be within said limit for charges; and if both are verified, confirming said transaction.

2. The process of Claim 1 wherein said electronic communication is mediated by a clearing bank at which a dedicated account is established for said local bank with a limit of charges against said bank dedicated account related to the aggregate of said customer dedicated accounts at said local bank and further comprising, in response to said confirmation, the step of adjusting the bank dedicated account to reflect execution of said payment instructions.

3. A process for settling payments of buyers in electronic purchase-sale transactions comprising the steps of:
   a) establishing at each of a plurality of local banks customer dedicated accounts for each of a plurality of said buyers, said step comprising the step of establishing for each of said customer dedicated accounts a limit for charges against said customer dedicated account;
   b) establishing at a clearing bank bank dedicated accounts for each of said plurality of local banks each having a limit for charges equal to the aggregate limits of each customer dedicated account for each bank;
c) electronically communicating in real time to said local banks requests for confirmation of transactions; and
d) upon such confirmations, adjusting the bank dedicated accounts to said aggregate customer dedicated account limits upon settling said payments.

4. A system for settling payments by buyers in an electronic purchase-sale transactions comprising:
   a) local banks that have knowledge of the signature and financial condition of said buyers at which said buyers have accounts; and
   b) an electronic clearing bank at which aggregate buyer accounts of said local financial institutions are updated and which presents to said local financial institutions for verification records of said electronic purchase-sale transactions.
Fig. 1
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

- **IPC(7):** G06F 17/60
- **US CL:** 705/40

According to International Patent Classification (IPC) or to both national classification and IPC.

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

- **U.S.:** 705/40 & 705/39

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched.

Electronic database consulted during the international search (name of database base and, where practicable, search terms used)

- Internet, Proquest database, Corporate Resource Net database, East database-US, EPO, JPO, Derwent

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
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<tbody>
<tr>
<td>X</td>
<td>US 5,420,405 A (CHASEK) 30 May 1995, entire document</td>
<td>1-4</td>
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<tr>
<td>X</td>
<td>US 5,677,955 A (DOGGETT et al) 14 October 1997, entire document</td>
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<tr>
<td>X</td>
<td>US 6,021,202 A (ANDERSON et al) 01 February 2000, col.10, line 37-col.38, line 10.</td>
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<td>A</td>
<td>US 5,745,574 A (MUFTIC) 28 April 1998, entire document</td>
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<td>A</td>
<td>Anonymous, &quot;Bankerserv and Experian Partner to Create Unique Online Authentication of Identity Service for E-check Users&quot;, Wall Street; Hightech; Business; BIZ, Business Wire,</td>
<td>1-4</td>
</tr>
<tr>
<td>A</td>
<td>Anonymous, &quot;New York City Residents Can Now Pay Bills By Check Online; Paybycheck.com and govWorks Enable Checking Account Payments Online&quot;, Wall Street;</td>
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</tr>
<tr>
<td>A</td>
<td>Anonymous, &quot;DCTI and Merchant Commerce Partner to Deliver Merchant E-commerce Solution DCTI’s Risk Management, Fraud Control and Reporting Services to be integrated With Merchant Commerce’s Front-End Merchant Management Services Alliance Provides Electronic Check Processing Through the ACH Network&quot;, Wall Street; Public Companies; PRN; Business, PR Newswire, 6 April 2000, extracted from Internet from the database, Corporate Resource Net on 14 September 2001.</td>
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</tr>
</tbody>
</table>

- See patent family annex.

**Further documents are listed in the continuation of Box C.**

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**Name and mailing address of the ISA/US**

Authorized officer
Yogesh C. Garg
Telephone No. 703-306-0252

Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231
Facsimile No. (703)305-3230

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