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**United States Patent  
Madani****7,299,980  
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Computer readable universal authorization card system and method for using same

**Abstract**

A computer readable universal authorization card system including a computer readable portion for conducting communications over a global network and a magnetic stripe for interfacing with debit card readers is disclosed. The system further includes an adapter having an impression for retaining the card for interfacing the card with a media reader.

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*Parent Case Text*

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CROSS REFERENCE TO RELATED APPLICATION

This application claims priority to U.S. Provisional Patent Application Ser. No. 60/291,180, entitled "CD ROM CREDIT CARD AND METHOD FOR USING THE SAME", filed May 15, 2001, the content of which is incorporated herein by reference as if set forth in full.

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*Claims*

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What is claimed is:

1. A computer readable universal authorization card system, comprising: a card having computer readable media on a first side for conducting communications over a global network and a magnetic stripe on a second side for interfacing with debit card readers; and an adapter adapted for fitting in a conventional tray for a computer readable media drive, the adapter having a recess in a first portion of said adapter for retaining said card within the adapter and wherein said adapter interfaces the card with a media reader, wherein said computer readable media comprises encrypted data adapted to be remotely accessed and decrypted by an authentication server via the global network.
2. The computer readable universal authorization card system of claim 1 wherein said computer readable media comprises a CD-ROM and wherein said adapter interfaces said card with a CD-ROM drive.
3. The computer readable universal authorization card system of claim 1 wherein said card further comprises a card aperture translated off center of said card and wherein said adapter further comprises an adapter aperture overlapping with said card aperture for interfacing said card with a media reader.
4. The computer readable universal authorization card system of claim 1 wherein said recess is translated off center of said adapter.
5. The computer readable universal authorization card system of claim 1 wherein said computer readable media comprises cardholder data.
6. The computer readable universal authorization card system of claim 5 wherein said cardholder data comprises a cardholder account number.
7. The computer readable universal authorization card system of claim 5 wherein said computer readable media further comprises an authorization program stored in said computer readable media that enables remote access to the computer readable media.
8. The computer readable universal authorization card system of claim 1 further comprising cardholder data encoded in said magnetic stripe.

9. The computer readable universal authorization card system of claim 1 wherein at least said first portion of said adapter is optically transparent.
10. The computer readable universal authorization card system of claim 1 wherein thickness of said card is approximately equal to depth of said recess.
11. The computer readable universal authorization card system of claim 10 wherein total thickness of said adapter in a second said non-recessed portion is in a range of about 1.3-1.7 millimeters.
12. The computer readable universal authorization card system of claim 1 wherein thickness of said card is in a range of about 0.7-0.95 millimeters.
13. The computer readable universal authorization card system of claim 12 wherein thickness of said card is approximately 0.78 millimeters.
14. The computer readable universal authorization card system of claim 1, wherein a combined card and adapter have a form that matches a form of standard media for the media reader and rotates as a unit when the media drive is activated.
15. The computer readable universal authorization card system of claim 1, wherein said card further comprises a card aperture translated off center of said card, wherein said adapter further comprises an adapter aperture overlapping with said card aperture for interfacing said card with a media reader, and wherein said recess is translated off center of said adapter.
16. The computer readable universal authorization card system of claim 1, wherein said encrypted data of said computer readable media is adapted to be remotely accessed and read via the global network by a merchant computing device and is further adapted to allow the merchant computing device to communicate the read data to an issuing institution computing device via another network, wherein the authentication server is located at the issuing institution computing device, and wherein said encrypted data is adapted to be decrypted at the issuing institution computing device.
17. A computer readable universal authorization card system, comprising: a card having computer readable media on a first side for conducting communications over a global network and a magnetic stripe on a second side for interfacing with debit card readers; and an adapter adapted for fitting in a conventional tray for a computer readable media drive, the adapter having a retention mechanism for coupling said card within the adapter and wherein said adapter interfaces the card with a media reader, wherein said computer readable media comprises encrypted data adapted to be remotely accessed and decrypted by an authentication server via the global network.
18. The computer readable universal authorization card system of claim 17 wherein said computer readable media comprises a CD-ROM and wherein said adapter interfaces said card with a CD-ROM drive.
19. The computer readable universal authorization card system of claim 17 wherein said card further comprises a card aperture translated off center of said card and wherein said adapter further comprises an adapter aperture overlapping with said card aperture for interfacing said card with a media reader.
20. The computer readable universal authorization card system of claim 17 wherein said impression is translated off center of said adapter.

21. The computer readable universal authorization card system of claim 17 wherein thickness of said card is in a range of about 0.7-0.95 millimeters.
22. The computer readable universal authorization card system of claim 17, wherein a combined card and adapter have a form that matches a form of standard media for the media reader and rotates as a unit when the media drive is activated.
23. A method for transmitting information over a global computer network, comprising: providing a universal authorization card with computer readable media comprising encrypted data stored on the universal authorization card; placing the universal authorization card within an adapter having a first surface and a second surface defining a first thickness therebetween, wherein the first surface includes a recess disposed therein for accepting the universal authorization card and wherein thickness of the universal authorization card is substantially equal to depth of the recess; and wherein the adapter is adapted for fitting in a conventional tray of a computer readable media drive; accessing said encrypted data remotely via the global network by an authentication server; and decrypting said encrypted data by the authentication server.
24. The method of claim 23 wherein thickness of said card is in a range of about 0.7-0.95 millimeters.
25. The method of claim 24 wherein thickness of said card is approximately 0.78 millimeters.
26. The method of claim 23 wherein thickness of said second adapter surface is in a range of about 1.3-1.7 millimeters.
27. The method of claim 23, further comprising: placing the adapter in the computer readable media drive with the universal authorization card in the recess of the adapter.
28. A computer readable universal authorization card system, comprising: a card having computer readable media accessible from a first side and a magnetic stripe readable on a second side; and a removable adapter defining a recess to retain the card within the adapter, the adapter and card combining to have a form factor matching a standard media type for a media drive, the media drive to rotate the adapter to access the computer readable media of the card, wherein thickness of said card is in a range of about 0.7-0.95 millimeters.

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### *Description*

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#### BACKGROUND OF THE INVENTION

This invention relates to systems and methods for facilitating communications and or commercial transactions over a public network, such as the Internet. More particularly, this invention relates to systems and methods for conducting secure online transactions.

Due to the development of the World Wide Web ("Web"), online commerce over the Internet has experienced dramatic growth in recent years. The Internet is used to conduct a broad range of commercial and financial transactions. Parties often use the communication capabilities of the Internet to enter into contracts or conduct business electronically and use electronic fund transfers (EFTs) to satisfy the resulting financial obligations. An EFT involves the movement of funds from one bank account to another in response to electronically-communicated payment instructions.

For example, an increasing number of merchants are developing websites that consumers may access and use to purchase goods and/or services. It is now common for a consumer to browse a merchant's online catalog, select a product, place an order for the product, and pay for the product all electronically over the Internet.

Although the Internet offers a fast, reliable, and efficient way to communicate and conduct business, information transmitted over the Internet or other global networks may be vulnerable to security breaches. For example, consumers typically pay for the goods and/or services ordered over the Internet with a credit card. During the online transaction, the merchant sends an order form and asks the consumer to enter personal data such as his name, address, and telephone number, and credit card information such as an account number and expiration date. The consumer returns the completed order form containing the credit card information to the merchant over the Internet. The merchant verifies that the credit card information is valid and that the card can be charged the payment amount. The card verification is usually conducted over a proprietary card verification network, such as the VisaNet network.

One problem with traditional online credit card transactions is the lack of signature verification. Presently, an online merchant has no way to verify that the individual providing the credit card number is authorized to use the card. The card number may be from a stolen card or merely copied from an old credit card receipt. Another problem concerns the security of the credit card data as it travels over the Internet. The credit card information can be intercepted in route, copied into a database and used to make unauthorized purchases. In an automated environment, a thief can repeatedly use the stolen credit card information to readily conduct many online transactions before the consumer ever becomes aware that the credit card data has been stolen.

## SUMMARY OF THE INVENTION

The computer readable universal authorization card system and method of the present invention substantially improves on the prior art online commerce model. With the computer readable universal authorization card, data is securely transmitted over the Internet, and even if stolen, the data cannot be used by the thief to make unauthorized online transactions. In addition, the card includes a user verification feature. Further, the computer readable universal authorization card is entirely compatible with existing systems for settling accounts.

In one aspect of the present invention a computer readable universal authorization card is sized in accordance with standard size debit cards. An exemplary card includes a computer readable portion for conducting secure communications over a global network and a magnetic strip that is compatible with conventional ATM or point of sale debit card readers. An exemplary embodiment may further include an adapter having an impression on one side for retaining said card within the adapter wherein the adapter interfaces the card with a local media reader.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of a computer readable universal authorization card in accordance with an exemplary embodiment of the present invention;

FIG. 2 is a simplified block diagram illustrating an online commerce system in accordance with an exemplary embodiment of the present invention;

FIG. 3 is a flow chart graphically illustrating the processing of a consumer purchase in accordance with an exemplary embodiment of the present invention;

FIG. 4 is a flow chart graphically illustrating the processing of a consumer purchase while utilizing an acquiring bank in accordance with an exemplary embodiment of the present invention;

FIG. 5 is a top view of the computer readable universal authorization card illustrating the integration of a magnetic stripe, a signature line and a aperture for interfacing with a media reader in accordance with an exemplary embodiment of the present invention;

FIG. 6 is a bottom view of the computer readable universal authorization card illustrating the integration of computer readable media on a second side of the computer readable universal authorization card wherein the aperture for interfacing with a media reader is laterally translated off the center of the card in accordance with an exemplary embodiment of the present invention;

FIG. 7 is a cross-section view of a roller system used for inserting and ejecting cards into standard debit or ATM card readers;

FIG. 8 is a simplified block diagram illustrating an online commerce system utilizing an authentication service for verifying identity of an application in accordance with an exemplary embodiment of the present invention;

FIG. 9 is a cross-sectional view of an adapter for interfacing the computer readable universal authorization card with a standard media reader in accordance with an exemplary embodiment of the present invention; and

FIG. 10 is a planview of the adapter of FIG. 9 graphically illustrating the depression in the adapter for retaining the computer readable universal authorization card in accordance with an exemplary embodiment of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

An exemplary embodiment of the present invention provides a method and apparatus for securely communicating information over a global network and for interfacing with standard debit card readers. The described exemplary embodiment provides a user verification feature such as a personal identification number which substantially duplicates the security provided by the personal verification that may accompany typical face to face transactions. Although in one embodiment the present invention will be described as a CD-ROM credit card, it is to be emphasized that the present invention may be implemented on any computer readable media such as DVD, MP3, or floppy disk, or any other computer readable media. In addition, given the rapid rate of technological development in the field of computing, it is expected that other storage media suitable for use with the credit card of the present invention will be developed. In addition, the present invention is not limited to credit cards, rather the present invention is equally applicable to stored value cards, ATM cards, gift cards, access cards, loyalty cards etc.

An exemplary embodiment of the present invention provides a method and apparatus for securely transferring funds over an insecure global network. The described exemplary system preferably encrypts payment data such as for example credit card or debit card information prior to the communication of the payment data over the insecure network. In addition, in an exemplary embodiment the online merchant does not decrypt the payment data. Rather, the cardholder may be redirected to the web site of the financial institution that issued the card or an authorized third party and the encrypted data may then be directly communicated to the issuing financial institution. Alternatively, the merchant may simply forward the encrypted data to the issuing financial institution.

In accordance with an exemplary embodiment, the issuing institution or an authorized third party may then decrypt the payment information and authenticate the buyer using for example a personal identification number. The issuing financial institution may then verify the balance of the buyer's account and may then authorize payment and utilize conventional proprietary credit card systems to initiate a guaranteed payment to the merchant. Therefore, the described exemplary payment method integrates with current electronic payment systems and associated protocols which are entrenched in the merchant and banking communities and experience a high level of acceptance and trust. The described exemplary system therefore does not usurp current electronic payment systems, nor does it require merchants to implement different systems and protocols.

In an exemplary embodiment of the present invention the transmission of data between the parties participating in the online transaction may be made using any one of a variety of secure protocols. One of skill in the art will appreciate that there are a variety of ways to encrypt data streams ranging from those that provide highly secure packets to those that provide a basic level of encryption. Determining the best way to encrypt the streams usually involves a trade-off between level of security and computational expense. Often, the more secure the encryption, the more complex the mathematical algorithm and the more processing power (and added latency as a result) required to encrypt the packet.

For example, in an exemplary embodiment transmission of data may be made using secure socket layer (SSL) protocols and standard 128 bit encryption technology. SSL protocol is an optional layer that fits between the transmission control protocol (TCP) layer and the hypertext transfer protocol (HTTP) layer. SSL verifies the identity of the parties involved in a secure transaction and ensures that data transmission is protected from tampering or interception. As is known in the art SSL protocol supports a plurality of cryptographic algorithms. It is assumed however that 128 bit data encryption may be utilized for secure sessions. One of skill in the art will appreciate however that the present invention is not limited to a particular security protocol or encryption technique. Rather, it is expected that secure-data-transmission protocols and encryption technology will continue to improve and that future developments in these technologies will be applicable to the credit card of the present invention. In addition, higher levels of encryption may also be used to provide greater security without affecting the operation of the present invention.

FIG. 1 illustrates the described exemplary CD-ROM credit card 10. In accordance with an exemplary embodiment the CD-ROM 16 used for the CD-ROM credit card may be a conventional CD-ROM which is configured to have a length and width suitable for carrying in a purse or wallet, yet is still readable by a typical CD-ROM drive. In an exemplary embodiment the CD-ROM credit card may store encrypted consumer account information 12 which typically will include the same account information found on a conventional credit card such as, for example, the consumer's account number 18 expiration date etc. One of skill in the art will appreciate that there are a variety of cipher or encryption algorithms that may be used to encrypt the consumer account information. For example, in an exemplary embodiment DKPUT, DES, Triple DES, DSA, RSA etc. may be used to encrypt the card holder data.

An exemplary embodiment of the CD-ROM credit card of the present invention may also comprise an authorization computer program 14. In one embodiment the authorization computer program may be self-executing and may function to enable data stored on the CD-ROM credit card to be remotely accessed. For example, in one embodiment the authorization program may reset permission on the card holder's computing system to allow the removable media, in this instance the CD-ROM to be accessed remotely. The authorization computer program 14 may comprise a Java application or any other suitable code.

Referring now to FIG. 2, a simplified block diagram of an exemplary online commerce system 20 for

conducting online commerce transactions is depicted. In the described exemplary embodiment there may be at least three parties that participate in an exemplary online commerce transaction, a consumer 22, a merchant 24, and an issuing bank 26. One of skill in the art will appreciate that the consumer and merchant may represent individuals, entities, or businesses. In addition, although labeled as a bank, the issuing bank may represent a bank or any other type of financial institution that issues credit cards or debit cards. It should also be noted that in many online transactions there may be a fourth party, namely an acquiring bank 28 or other intermediary settlement institution involved in the transaction to process the merchant's credit card transactions.

In an exemplary online commerce system 20 a consumer or cardholder 22, online merchant 24, issuing bank 26 and acquiring bank 28 are equipped with a computing system to facilitate online commerce transactions. In the described exemplary embodiment the consumer 22 may be equipped with a computing system 30 having a CD-ROM drive 32 and a program, such as for example, a Web browser 34 for accessing a communication network 60. The consumer's computing system may take many forms but may typically be in the form of a personal computer. However, the consumer's computing system may also be a notebook computer, or any other device having the ability to read stored media, and being capable of engaging in communication over communication network 60.

In accordance with an exemplary embodiment the online merchant 24 may have a computing system 36 that may often be in the form of a computer server which may be capable of hosting a website 40. In addition, the issuing bank 26 may also have a computing system 42 that may often be in the form of a computer server which may also be capable of hosting a website 48. While only one customer 22 is shown in FIG. 2, it will be understood that the system 20 is capable of interaction with multiple customers through a suitable interface.

In the described exemplary embodiment, the acquiring bank 28, if any, may also have a computing system 50. The computers of the issuing and acquiring banks may often be in the form of a mainframe computer, but other implementations such as a micro-computer, a networked set of computers and the like, are also possible. Typically, the other participants to the online commerce transaction will also have a CD-ROM drive, though this is not required for the system and method of the present invention to operate.

The computing systems 30, 36, 42, and 50 (if present) may engage in two-way communication over a suitable communication network 60. In one embodiment, communication network 60 may comprise a global computer network such as for example the Internet. However, it will be understood by those skilled in the art that the communication network may take many different forms, such as an interactive television network, a local area network (LAN), wide area network (WAN), wired telephone network, wireless network, or any other network that supports data communication between respective entities.

In this context the computing systems may or may not be connected to the network at all times. For instance, the consumer's computing system may employ a modem to occasionally connect to the Internet, while the issuing bank's computing system may maintain a permanent connection to the Internet. The merchant's computing system 36 and the issuing bank's computing system 42 may also be coupled to a proprietary electronic funds transfer ("EFT") network, such as those operated by First Data, Vital, Star or Cirrus. Where an acquiring bank 28 is involved in the transaction, the acquiring and issuing bank's computing systems 50 and 42 respectively may also be connected by a proprietary EFT network.

The described exemplary electronic payment method may provide advantages for both consumers and merchants regarding EFT network interchange fees (fees charged by an issuing bank to an acquiring bank when both are involved in the online commerce transaction). However, one of skill in the art will

appreciate that an EFT network is not required for the system and method of the present invention to operate.

Referring to FIGS. 2 and 3, in an exemplary embodiment a consumer 22 may apply to an institution such as for example, an issuing bank 26 for the described exemplary CD-ROM credit card 80. A consumer may apply for the described exemplary CD-ROM credit card in accordance with any of a variety of known methods. For example, the consumer may apply for the CD-ROM credit card by mail, telephone, in-person, or online. In an exemplary embodiment, the consumer may access an issuing bank's website and download an application module. The application module may contain a "Help Wizard" to assist the consumer in filling out the application.

In an exemplary embodiment the application module may present web pages created with hyper text markup language ("HTML") which request certain personal and financial information, such as the consumer's name, address, telephone number, social security number, income, presently owned credit cards, bank affiliations, and the like. The consumer may complete the online CD-ROM credit card application and submit the application to the issuing bank. In the described exemplary embodiment the registration module contains all of the routing information required to direct the application over the Internet to the issuing bank.

In accordance with an exemplary embodiment the issuing bank 26 evaluates the consumer's CD-ROM credit card application and informs the consumer as to whether the card will be granted or denied 82. In one embodiment this information may be conveyed to the consumer 22 in the same manner the credit application was received by the issuing bank. In the described exemplary embodiment, this message is transmitted by email. When the issuing bank grants a CD-ROM credit card, the card may be assigned an account number, expiration date and an associated personal identification number (PIN). In an exemplary embodiment the issuing bank may send the CD-ROM credit card to the consumer by parcel post or any known parcel delivery service. In addition, the issuing bank may send the PIN number assigned to the account to the consumer, typically in a separate mailing (or by email) for security reasons 84.

In the described exemplary embodiment the consumer may load the CD-ROM credit card into a CD-ROM drive to activate the CD-ROM credit card 86. In one embodiment the self-executing authorization program may automatically install itself on the consumer's computing system and enable the CD-ROM drive to be read remotely, for example, from a remote website via a global computer network. Alternatively, the authorization program may activate an installation wizard or the web browser on the consumer's computing system and ask the consumer whether he wants to have the authorization program installed.

Upon successful installation of the authorization program, the consumer may access the issuing bank's website 48 which may then read the encrypted information on the consumer's CD-ROM credit card by means of an access program 46. In an exemplary embodiment the access program 46 may be in the form of a Java application or any other suitable code. Upon receiving and decrypting the encrypted card holder data, which maps to an account number 18, the issuing bank's website requests that the consumer transmit his PIN 44 number to the issuing bank. One of skill in the art will appreciate that the issuing bank may establish a secure session between itself and the consumer and the consumer's PIN number may be encrypted prior to communication to the issuing bank via the secure session. In accordance with an exemplary embodiment the issuing bank may validate the consumer's PIN number 44 and activate the consumer's CDROM credit card.

In the described exemplary embodiment the consumer may initiate an online commercial transaction by invoking his web browser and navigating to an online merchant's web site to purchase a particular

product or service 88. In operation many online merchant web sites include shopping carts and associated order forms displayed in the form of Web pages that a consumer may complete to purchase selected items. Often the online order form may include a payment section where the consumer may indicate a desire to pay for the purchase with the described exemplary CD-ROM credit card.

In accordance with an exemplary embodiment the merchant's website 40 may prompt the consumer to load the described exemplary CD-ROM credit card into his CD-ROM drive. The consumer may then indicate that the CD-ROM credit card is loaded into the drive at which point the access program 38 on the merchant's website may read the encrypted CD ROM credit card data 90. In the described exemplary embodiment the online merchant does not have the key to decipher the encrypted payment data. Rather, the merchant may redirect the card holder to the issuing institution identified on the CD-ROM credit card 92. The described exemplary payment system may therefore reduce merchant credit card fraud by denying the merchant access to the consumer's payment information.

One of skill in the art will appreciate that in operation a merchant may simply redirect the consumer to the issuing bank's web site and the issuing bank may establish a secure session with the consumer and read the encrypted credit card data directly from the cardholder's CD-ROM credit card using the access program 46 on the issuing banks computing system 42. In this embodiment, the merchant may never have access to the CD-ROM data so that the data need not be encrypted if communicated via a secure session as previously described.

In accordance with an exemplary embodiment the issuing bank may decipher the consumer's encrypted payment data and if necessary establish a secure connection with the consumer's computing system. In one embodiment the issuing bank may prompt the consumer to enter his PIN number 94 to validate the identity of the consumer. In the described exemplary embodiment the issuing bank may then verify the PIN number 96 and reject the transaction if the PIN number is not verified 100. In an exemplary embodiment the issuing bank may give the consumer a predetermined number of attempts to transmit the correct PIN number before rejecting the transaction. If the PIN number is validated, the issuing bank may verify that the consumer's account is in good standing with sufficient available credit to pay for the purchase. The issuing bank may authorize the transaction, reduce the consumer's available credit by the purchase amount and subsequently make payment to the merchant 98.

The described exemplary CD-ROM credit card may also be utilized in online transactions involving an acquiring bank that processes the merchant's credit card transactions. In these instances the issuing bank may charge the acquiring bank a fee, known as an "interchange fee," for processing the transaction. Such transactions may often take place over proprietary EFT networks. In practice the amount of the interchange fee often varies in accordance with the type of credit card transaction and may be separately established by each particular credit card association, such as, for example, Visa, Mastercard, or Discover. Within each particular association, the interchange fees may often be set at the same rate for all issuing banks. In general, there are two types of credit card transactions, card-swipe transactions and card-not-present transactions.

A card-swipe transaction is a conventional in-store, retail transaction where a consumer purchases a product in the merchant's store and the consumer's credit card is physically swiped through a card reader. Typically, the merchant will attempt to verify that the consumer is the valid card holder by matching the consumer's signature with the signature on the credit card, or by asking for a valid identification, etc. Card-swipe transactions may therefore have a greater degree of security than card-not-present transactions where a consumer may make a purchase over the phone, or online, by giving the merchant a credit card number only. Therefore, the identity of the card holder may not be verified in card not present transactions using conventional means such as for example signature verification, etc.

As such, the risk of fraudulent purchases may be greater in card-not-present transactions than in card-swipe transactions. Therefore, issuing banks may charge acquiring banks a higher interchange fee for card-not-present transactions than for card-swipe transactions. Presently, the interchange fee for card-swipe transactions is on the order of about 1.38% of the transaction value, while the interchange fee for card-not-present transactions is on the order of about 1.82% of the transaction value. The above stated fees are exemplary only. Each credit card association imposes its own interchange fee structure.

The security provided by the described exemplary CD-ROM credit card may encourage issuing banks to reduce or eliminate the disparity in interchange fees between card-swipe transactions and card-not-present transactions. In practice the use of a secure PIN number in online credit card transactions provides a similar degree of security as the in person signature verification of card-swipe transactions. Therefore issuing banks may process CD-ROM credit card transactions at the same rate card-swipe transactions are processed.

FIG. 4 graphically illustrates an exemplary online commerce transaction involving an acquiring bank. The process is similar to the transaction described in FIG. 3. For example, a consumer may again initiate an online commercial transaction by invoking his web browser and navigating to an online merchant's web site to purchase a particular product or service. The merchant's website may again prompt the consumer to load the described exemplary CD-ROM credit card into his CD-ROM drive 88. The consumer may then indicate that the CD-ROM credit card is loaded into the drive at which point the access program on the merchant's website may read the encrypted CD ROM credit card data 90. In the described exemplary embodiment the online merchant does not have the key to decipher the encrypted payment data. Rather, the merchant redirects the card holder or consumer to the acquiring bank 120 which then forwards the encrypted credit card data to the issuing bank 122.

One of skill in the art will again appreciate that in operation a merchant may simply redirect the consumer directly to the issuing bank's web site or to the acquiring bank that may then redirect the consumer to the issuing bank. The issuing bank may establish a secure session with the consumer and read the encrypted credit card data directly from the cardholder's CD-ROM credit card using the access program 46 on the issuing banks computing system 42.

In accordance with an exemplary embodiment the issuing bank may decipher the consumer's encrypted credit card data and if necessary establish a secure connection with the consumer's computing system. In one embodiment the issuing bank may prompt the consumer to enter his PIN number 124. The issuing bank may decrypt the consumers PIN number and compare it to the PIN number of record for the received credit card account number to validate the identity of the consumer 126. In the described exemplary embodiment the issuing bank may reject the transaction if the PIN number is not verified 128.

In an exemplary embodiment the issuing bank may give the consumer a predetermined number of attempts to transmit the correct PIN number before rejecting the transaction. If the PIN number is validated, the issuing bank may verify that the consumer's account is in good standing with sufficient available credit to pay for the purchase. The issuing bank may authorize the transaction, reduce the consumer's available credit by the purchase amount and credit the acquiring bank the dollar value of the transaction less the interchange fee 130. The acquiring bank then pays the purchase amount to the merchant, less the interchange fee and any markup assessed to the merchant 132.

Advantageously, in the described exemplary electronic payment system the encrypted CD ROM credit card data is only decoded by the issuing bank. Neither the merchant, nor the acquiring bank, if any, decode the data during transaction processing. The restricted access to the CD ROM credit card data reduces the likelihood that any of the parties to the transaction will misuse the credit card data. In

addition, the communication and verification of the card holders PIN number during a separate transmission from the credit card data reduces the likelihood of third party credit card fraud. In practice the prospect of an outside party successfully intercepting and decoding both the credit card data and the PIN number are remote.

Although an exemplary embodiment of the present invention has been described, it should not be construed to limit the scope of the appended claims. Those skilled in the art will understand that various modifications and improvements may be made to the system and method disclosed herein without departing from the scope of the invention. For example, the functions of the issuing and acquiring banks may be performed by third parties such as First Data Corporation and Vital, Incorporated. Third party processors often work with acquiring banks to process credit card transactions via the card associations or card issuers.

For example, in one embodiment a third-party processor communicates to the card associations or card issuers to obtain authorizations and execute funds transfers. When purchasing a product online, the CD ROM credit card holder may again use a web browser to exchange purchase information with the merchant. In this embodiment the merchant captures and communicates the purchase information and the encrypted credit card data to a third-party processor. The third-party processor then works with the appropriate card association or card issuer to execute the transaction.

It should be also be noted that the system and method of the present invention may also be applied to debit card transactions. A debit card allows the bearer to utilize the same purchasing process as with a credit or charge card, with the exception that the holder of a debit card normally may need to maintain a nonzero balance in an associated account. In practice, the use of a debit card does not involve the extension of credit to the bearer, thus the name debit or payment card.

Debit cards or payment cards are often used by customers to make purchases on-line, to withdraw funds from automated teller machines (ATMs) and more recently at point of sale (POS) terminals to gain access to their accounts for the withdrawal of funds in the form of cash or to purchase goods or services. However, debit card fraud has significantly increased as the volume of dollars moved by these services over the Internet has grown. An exemplary embodiment of the present invention provides a method and apparatus for conducting secure debit card transactions over an insecure communication network such as, for example, the Internet.

For example, referring to the top view of FIG. 5, an exemplary debit card may be sized in accordance with the requirements for conventional debit/ATM card readers. The described exemplary debit card 200 may comprise a magnetic strip 210 on a first side of the debit card that stores magnetic information concerning the debit card account, such as, for example, the issuing institution, the owner's account number, etc. as required for operation in a conventional ATM or POS terminal. The described exemplary debit card may further comprise a signature line 220 that may be used to verify the cardholders signature in card-swipe transactions.

In addition, referring to the bottom view illustrated in FIG. 6, the described exemplary debit card may further include computer readable media such as for example CD ROM compatible information 230 deposited on a second side of the described exemplary debit card. The CD ROM may again contain encrypted payment information issued by an issuing financial institution as described with respect to the CD ROM credit card illustrated in FIGS. 1-4. The described exemplary debit card may further comprise an aperture 240 for mounting in conventional CD ROM drives. However, many card readers utilize a multiple roller system 250 (a-c) as illustrated in FIG. 7 to insert and eject a debit card into and out of the reader. In practice, cards having an aperture located at the center of the debit card may get stuck in conventional multi-roller card reader systems.

Therefore, in an exemplary embodiment the aperture may be translated laterally away from the center of the debit card. For example, in one embodiment an exemplary debit card may be eighty six millimeters long and fifty four millimeters wide. The center of the aperture may be located thirty four millimeters from one end of the card and approximately twenty seven millimeters from one side of the card. The encoded information 230 may then be centered about the aperture for use in a CD ROM drive. One of skill in the art will appreciate that the location of the aperture may vary from application to application so that the disclosed location is by way of example only and not by way of limitation.

Referring to FIG. 8, in an exemplary embodiment the consumer 22 may apply to an institution, such as, for example, an issuing bank or other financial institution or a third party service provider for the described exemplary debit card. The consumer may apply for the described exemplary CD-ROM credit card in accordance with any of a variety of known methods. For example, the consumer may apply for the debit card by mail, telephone, in-person, or online. In an exemplary embodiment, the consumer may access a financial institutions website 48 via the communication 60 and download an application module. In the described exemplary embodiment the consumer may directly access the financial institutions website or be redirected there by a merchant's website. In an exemplary embodiment of the present invention the transmission of data between the parties to the online transaction over the communication network 60 may be made using any one of a variety of secure protocols.

In an exemplary embodiment the application module may present web pages created with hyper text markup language ("HTML") which request certain personal and financial information, such as the consumer's name, address, telephone number, social security number, income, presently owned credit cards, bank affiliations, and the like. The consumer may complete the online debit card application and submit the application to the issuing financial institution. In the described exemplary embodiment the issuing institution may forward the online debit card application to one of a variety of real time authentication services 300 that may be used to authenticate the identity of the applicant. In the described exemplary embodiment the issuing financial institution may forward the debit card application to the authentication service via the global communications network 60. However, one of skill in the art will appreciate that a direct circuit switched, wireless or other link may be established between the issuing financial institution and the authentication service for communicating the debit card application.

In an exemplary embodiment, the authentication service may compare applicant's data with multiple consumer databases to verify the consistency of the information supplied on the application. In addition, in the described exemplary embodiment the issuing financial institution may redirect the applicant to a website 320 on computer 310 of the authentication service. The authentication service may then ask the applicant one or more multiple choice questions based upon shared, relatively secret information known by the consumer and stored in the databases of a limited number of credit reporting agencies that are available to the authentication service. The authentication service may then compare the answers supplied by the applicant to the stored information to further verify that the person entering the information is the actual applicant whose identity has been submitted on the application.

Once the applicant's identity has been authenticated the issuing institution may further evaluate the applicant's debit card application and may inform the applicant whether the card will be granted or denied. When the issuing institution grants a debit card, the card is assigned an account number, expiration date and an associated personal identification number (PIN). In an exemplary embodiment the issuing institution may send the debit card to the consumer by parcel post or any known parcel delivery service. In addition, the issuing institution may send the PIN Number assigned to the account to the consumer, typically in a separate mailing (or by email) for security reasons.

In the described exemplary embodiment the initial debit card funding may be instantaneous, yet limited

using a credit card. However, one of skill in the art will appreciate that the debit card may be funded using cash, check, wire transfers, ACH etc. In addition, in an exemplary embodiment, a buyer may further fund an exemplary debit card account by visiting the website of the issuing institution and accessing their account via a secure link to transfer funds from a credit card to the debit card account.

In an exemplary embodiment of the present invention, the magnetic stripe and the CD compatible portion (hereinafter referred to as the CD card) of the described exemplary debit card may include the information typically found on an ordinary debit card such as the identity of the card holder, the account number, etc. However, the data stored on the CD card may be encrypted as previously described with respect to the CD ROM credit card. Alternatively, the CD card may include an encryption program that may encrypt stored payment data prior to communicating that data to a remote website.

In addition, as previously described with respect to the CD-ROM credit card, the CD card may further include an executable program, such as a Java application, which may be loaded onto the consumer's computer to allow for remote access to the data stored on the CD card by a corresponding program on a remote computing system. In one embodiment the executable program may be self-installing. Alternatively, the CD card may include an application that when prompted may simply upload information stored on the CD card to a remote website.

Prior to first use, the consumer may access a website owned or controlled by the issuing financial institution to activate the account as previously described with respect to the CD ROM credit card. In an exemplary embodiment, the consumer may now go shopping online or at any of a variety of POS locations worldwide. For example, in an exemplary embodiment the consumer may proceed to an online merchant's website and select several items to purchase using the described exemplary debit card as previously illustrated with respect to the CD ROM credit card in FIGS. 3 and 4.

The described exemplary debit card therefore provides convenience of use in conventional ATM or POS card readers located around the world as well as the ability to conduct secure commercial transaction over an insecure global network. The restricted access to the debit card data again reduces the likelihood that any of the parties to the transaction will misuse the credit card data. In addition, the communication and verification of the card holders PIN number during a separate transmission from the debit card data again reduces the likelihood of third party fraud.

The described exemplary debit card payment system may further comprise an adapter to provide increased compatibility with existing CD-ROM drives. For example, the described exemplary debit card may be in the range of about 0.7-0.95 millimeters thick and in an exemplary embodiment may be on the order of about 0.78 millimeters thick to ensure compatibility with typical ATM/POS debit card readers. One of skill in the art will appreciate, that the disclosed card thickness may vary in accordance with the thickness requirements of a given device reader so that the disclosed thickness ranges are by way of example only and not by way of limitation.

However, CD-ROM drives typically employ semiconductor lasers that transmit a Gaussian optical beam whose beamwidth varies with distance from the transmitter. Therefore, many conventional CD-ROM drives require that the CD-ROM be located within a given range of distances from the transmitter to ensure that an optical beam with a given range of beamwidths is incident upon the CD-ROM for adequate optical character recognition.

However, a debit card having a thickness that is compatible with typical ATM/debit card readers may not provide a sufficient offset from the optical transmitter in many conventional CD-ROM drives. Therefore, an adapter may be required to increase the spacing between the computer readable media on the described exemplary debit card from the optical reader in many CD-ROM drives. Further, in the

exemplary embodiment, the adapter is shaped to be compatible with and securely fit within a conventional CD-ROM drive.

Therefore, referring to the cross section of FIG. 9, an exemplary debit card payment system may include an adapter 400 having an depression 410 in a first surface 420 designed to receive the described exemplary debit card. In one embodiment the thickness 404 of the adapter 400 may be in a range of about 1.3-1.7 millimeters and in an exemplary embodiment may be on the order of about 1.5 mm as may be preferred by many conventional CD-ROM drives. In addition, the thickness 404 of the depression or recession 410 is approximately equal to the thickness of the debit card, so that when installed the top surface of card is approximately flush with the top surface of the adapter.

In one embodiment the described exemplary debit card may be coupled into the adapter with the computer readable media 230 (see FIG. 7) down. Therefore, in one embodiment, the optical reader in the CD ROM drive reads the computer readable media through the adapter. Therefore, the adapter 400 may comprise optical grade glass or plastic that is substantially transparent to the operational wavelength of the optical reader. The described exemplary adapter may be manufactured in accordance with any one of a number of known techniques such as for example, injection molding, stamping etc. The adapter may be made in different shapes and sizes for compatibility with DVD drives or other devices for facilitating computer readability.

A top view of the described exemplary adapter is illustrated in FIG. 10. In the described exemplary embodiment the size of the depression 410 approximately mirrors the size of the debit card. Therefore, in this embodiment the debit card may be press fit into the impression and retained therein. For example, in one embodiment, the depression 410 may have a height on the order of about 54 mm and width on the order of about 86 mm in accordance with the size of a standardized debit card (see FIG. 6). One of skill in the art will appreciate however that clips, springs or other retention mechanisms may be used to retain the card as well.

The adapter may further comprise an aperture 430 located so as to overlap with aperture 240 in the debit card (see FIG. 6) for coupling with the spindle in a CD-ROM drive. In the described exemplary embodiment the impression may be laterally offset from the center of the adapter so that the center of the aperture is located at the center of the adapter 400. IN operation, a cardholder may then insert the described exemplary debit card into the adapter and insert the adapter into the CD-ROM drive of a computing system to perform a secure online transaction. Alternatively, the cardholder may simply remove the card from the adapter and utilize the described exemplary debit card like a conventional debit card at any of a number of ATM or POS locations around the world.

To those skilled in the various arts, the invention itself herein will suggest solutions to other tasks and adaptations for other applications. It is the applicants intention to cover by claims all such uses of the invention and those changes and modifications which could be made to the embodiments of the invention herein chosen for the purpose of disclosure without departing from the spirit and scope of the invention.

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