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(54) **ENHANCED CREDIT CARD SECURITY APPARATUS AND METHOD**

(76) Inventor: **Narendra Patel**, San Antonio, TX (US)

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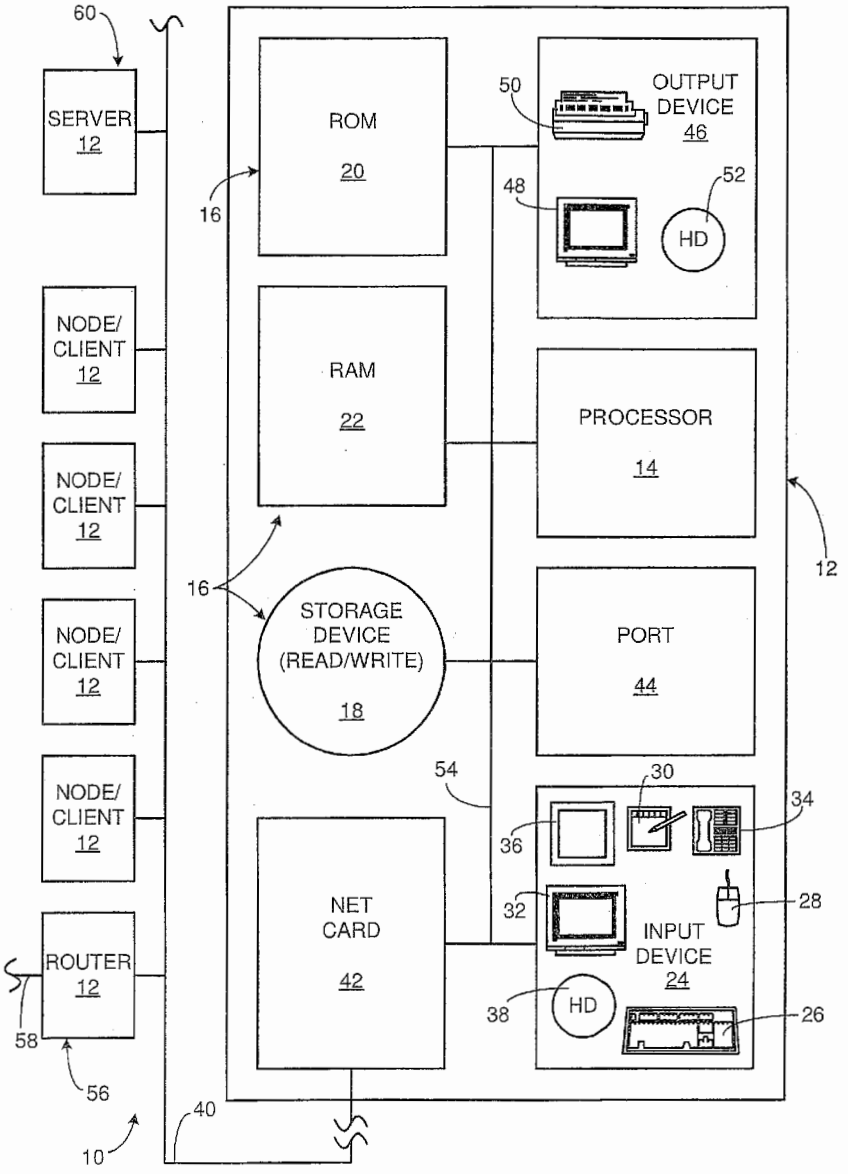
(57) **ABSTRACT**

A credit card, debit card, or other similar financial instrument is disclosed with the temporary assignment of a dynamic CVV for increased card security. The dynamic CVV is read, changed, and rewritten to the card with each transaction. To facilitate online purchases, a static CVV may also be provided for manual entry. Alternatively, the static CVV may be a reminder enabling a user to remember an unmarked static CVV, such as reading the digits in an order selected by a user, much like a PIN number.



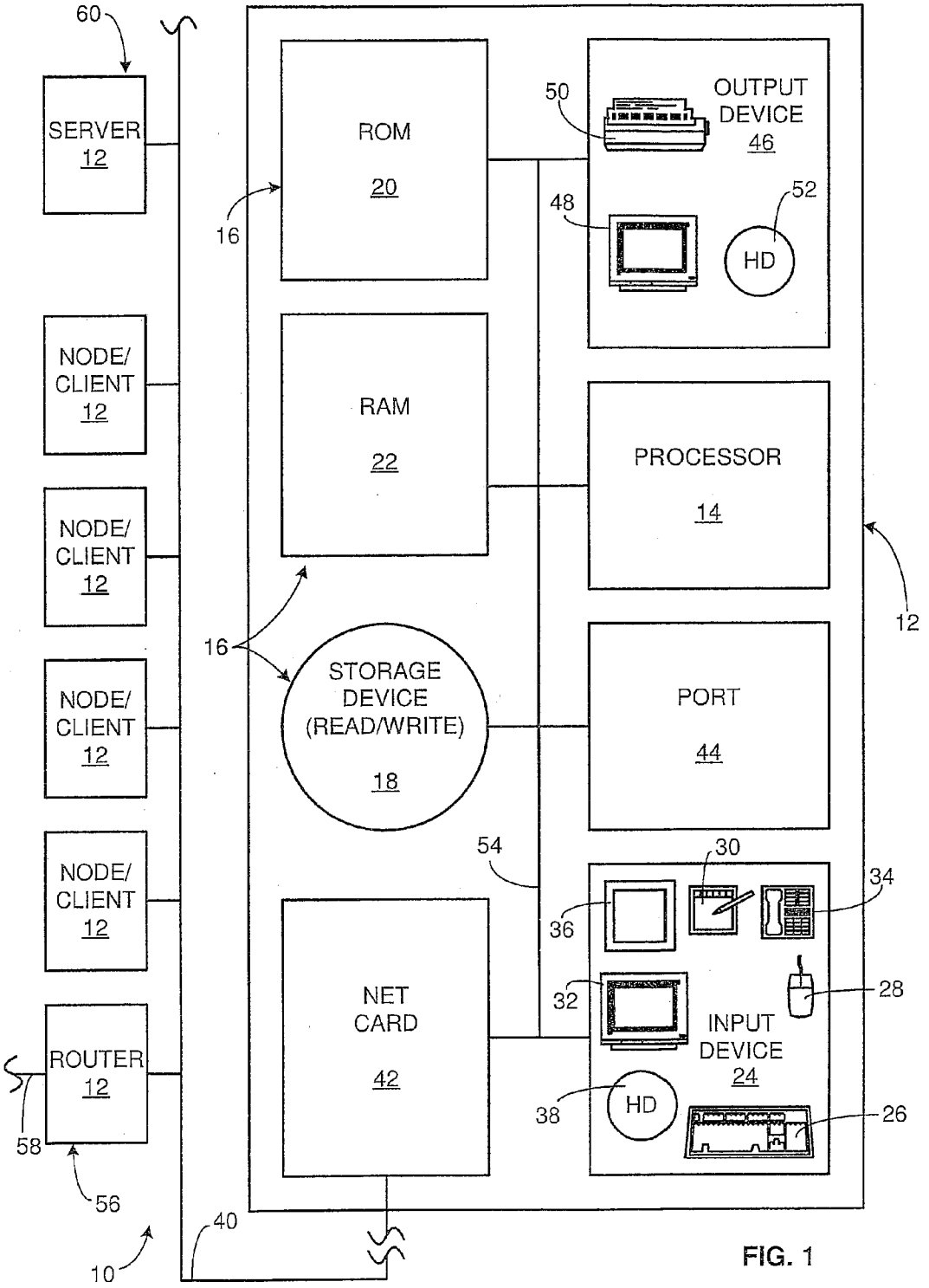

60
SERVER
12
NODE/
CLIENT
12
NODE/
CLIENT
12
NODE/
CLIENT
12
NODE/
CLIENT
12
ROUTER
12
58
56
10
40
16
ROM
20
RAM
22
STORAGE
DEVICE
(READ/WRITE)
18
NET
CARD
42
50
OUTPUT
DEVICE
46
48
52
HD
PROCESSOR
14
PORT
44
12
54
30
34
36
32
28
INPUT
DEVICE
24
38
HD
26

FIG. 1

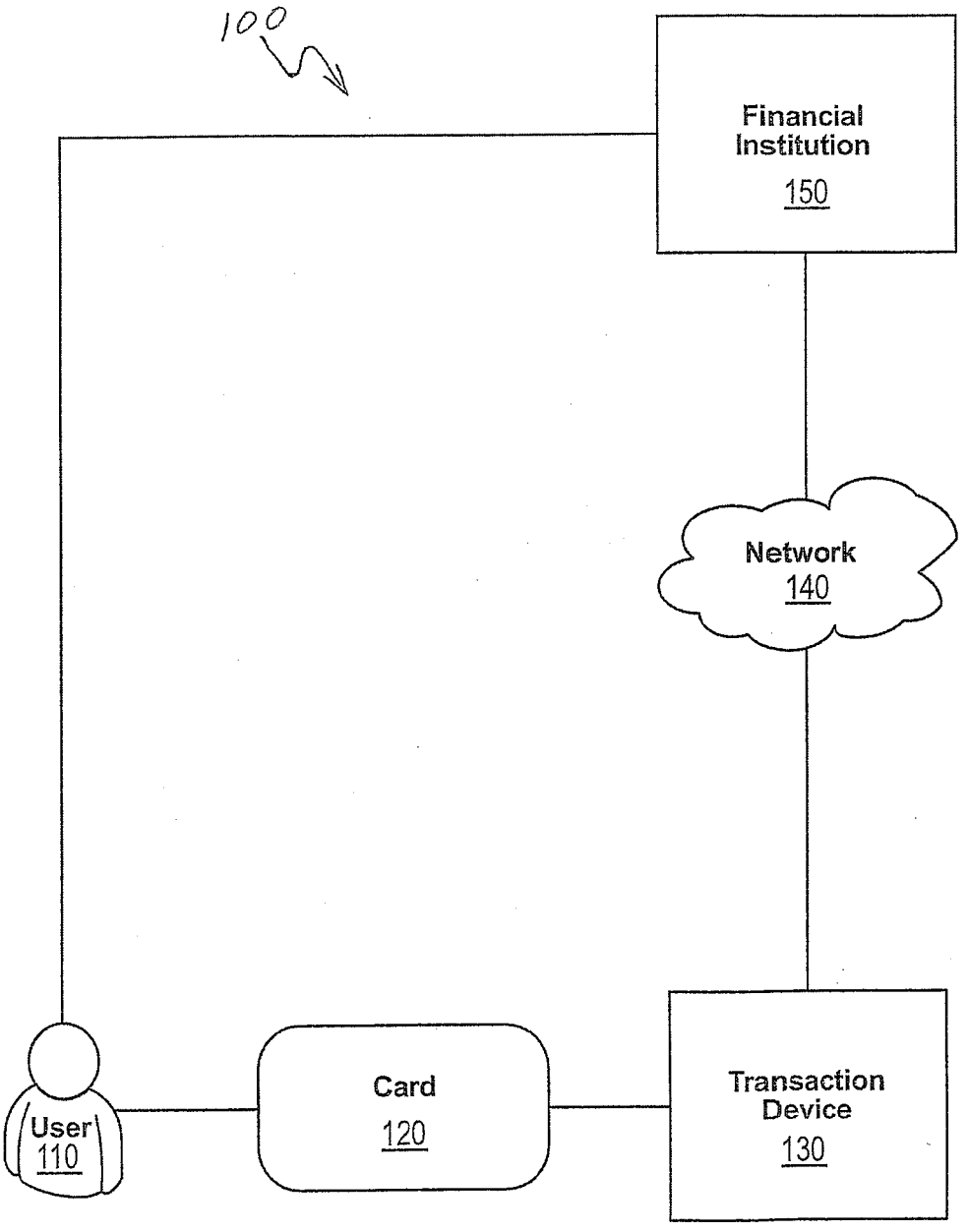

100
Financial Institution
150
Network
140
User
110
Card
120
Transaction Device
130

FIG. 2

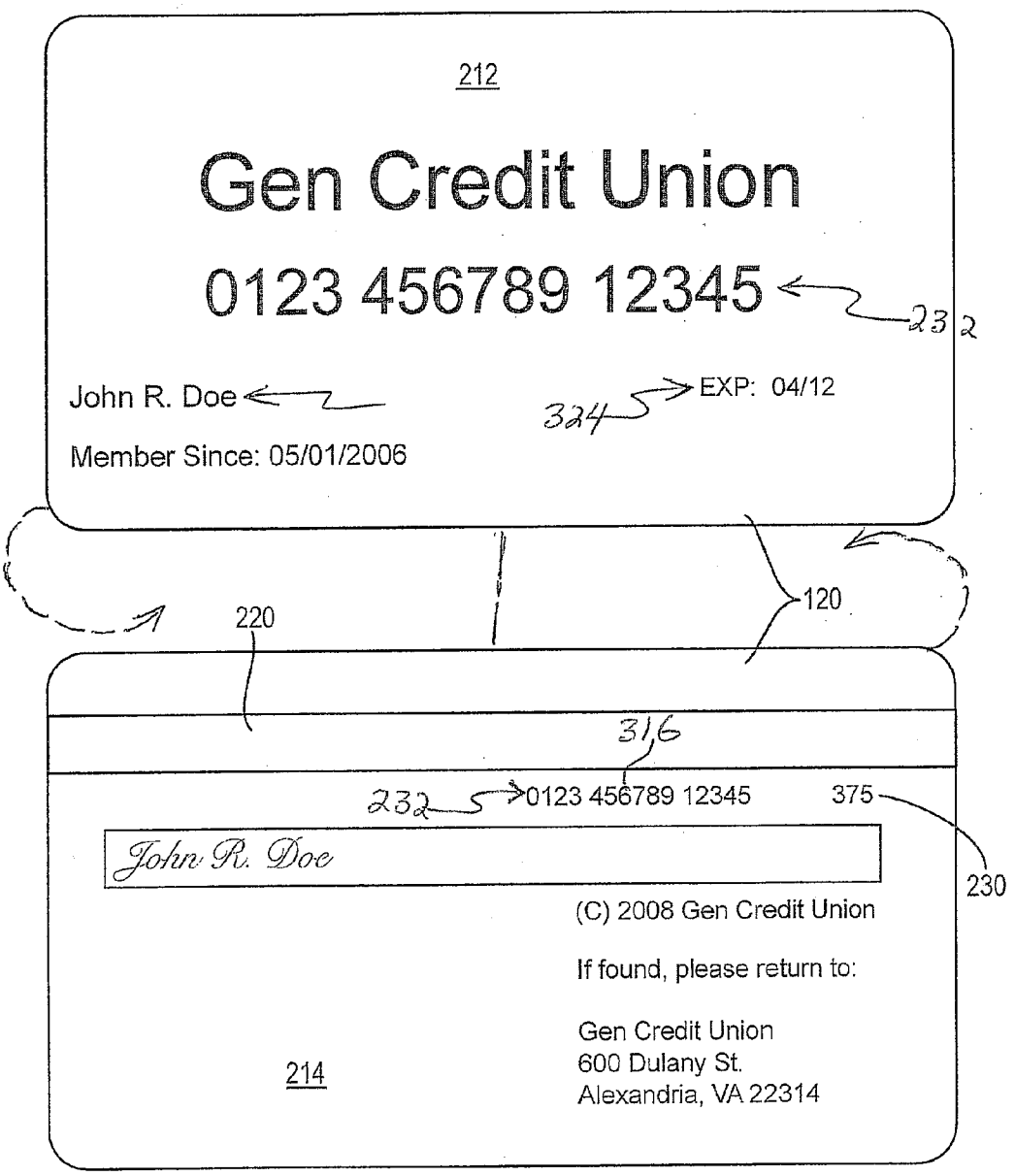

212
Gen Credit Union
0123 456789 12345
232
John R. Doe
324
EXP: 04/12
Member Since: 05/01/2006
120
220
316
232
0123 456789 12345
375
John R. Doe
230
(C) 2008 Gen Credit Union
If found, please return to:
Gen Credit Union
600 Dulany St.
Alexandria, VA 22314
214

FIG. 3

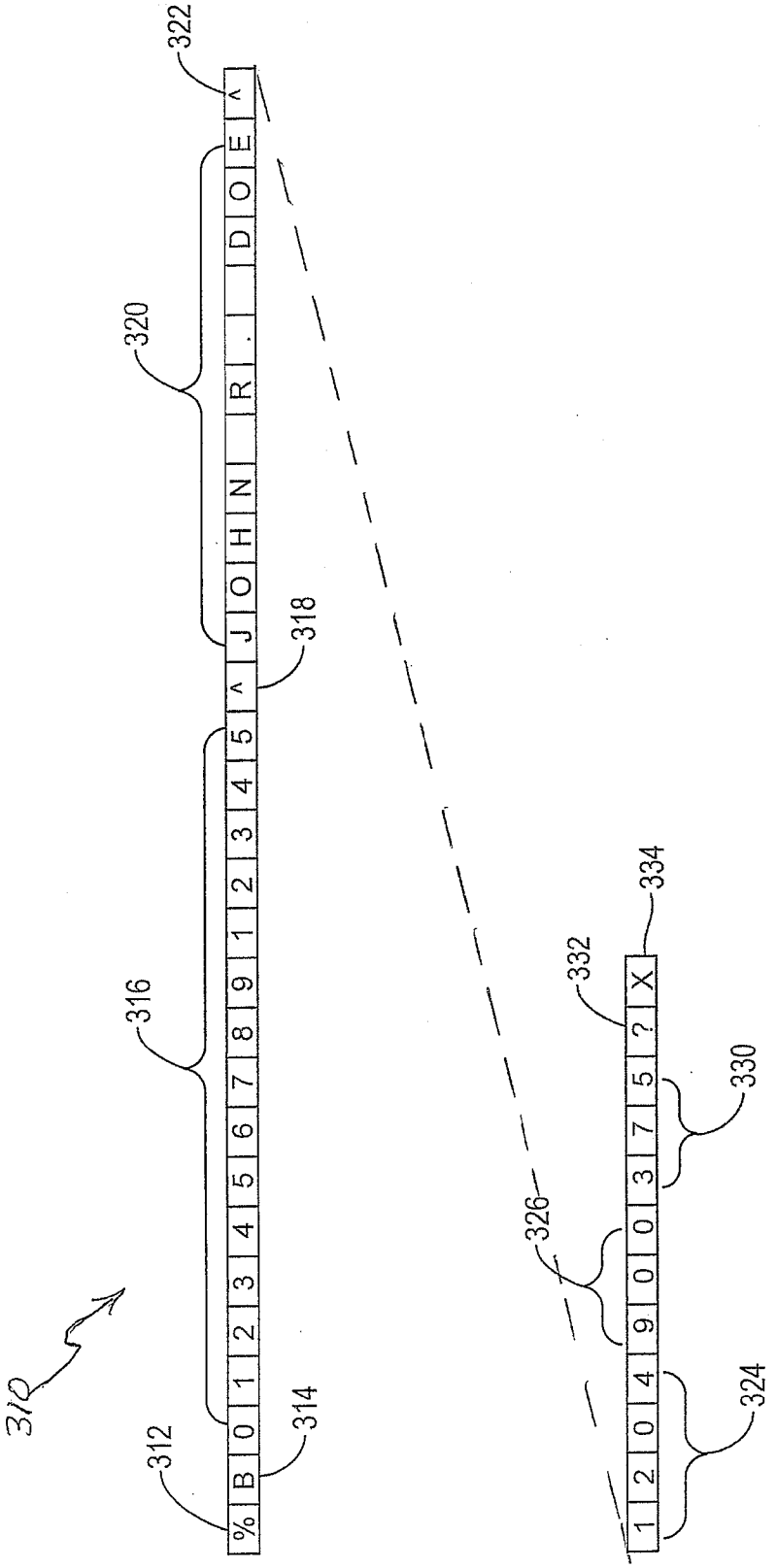

310
312
314
316
318
320
322
324
326
330
332
334
%
B
0
1
2
3
4
5
6
7
8
9
1
2
3
4
5
^
J
O
H
N
R
.
D
O
E
^
1
2
0
4
9
0
0
3
7
5
?
X

FIG. 4

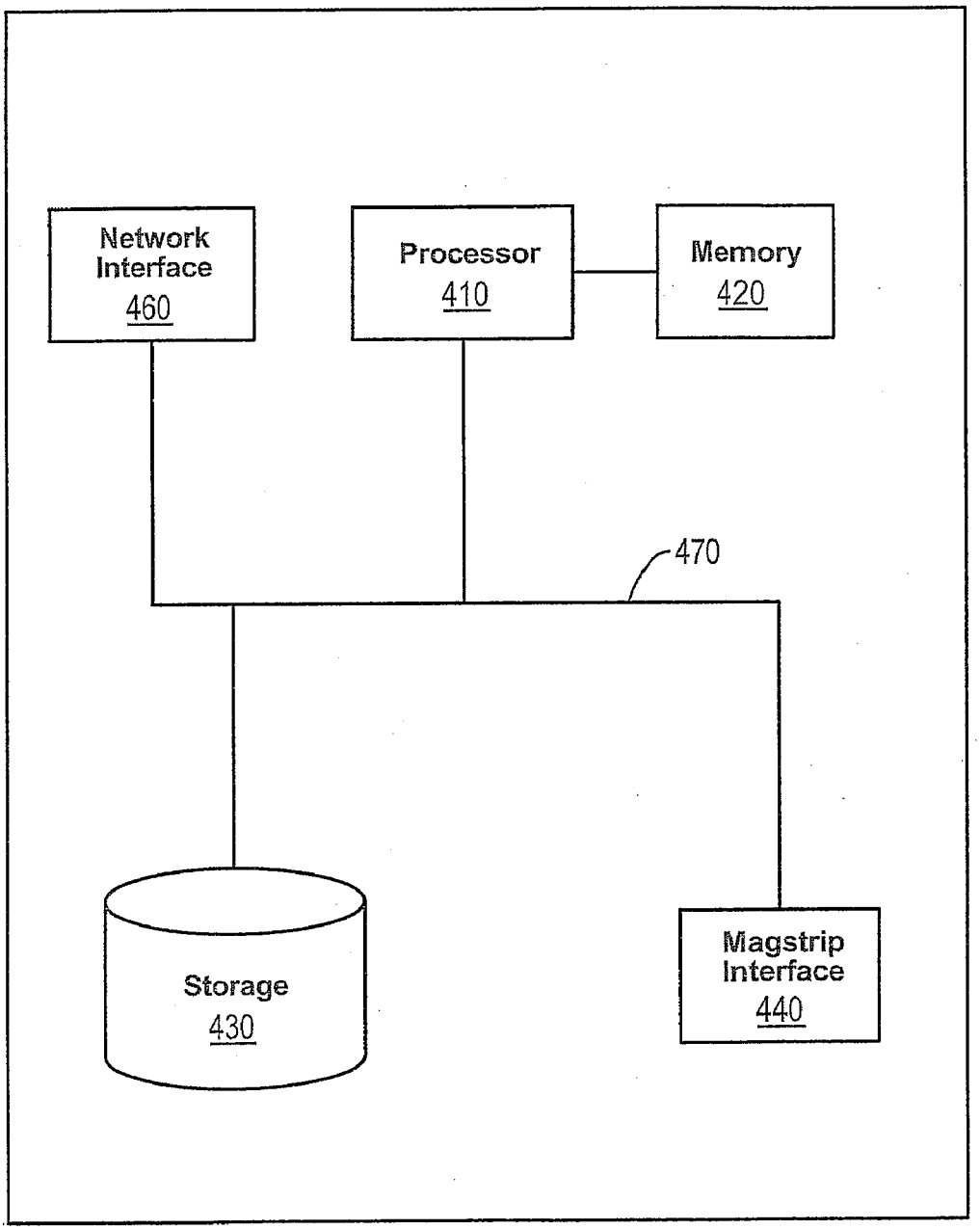

Network Interface
460
Processor
410
Memory
420
470
Storage
430
Magstrip Interface
440

FIG. 5

ENHANCED CREDIT CARD SECURITY APPARATUS AND METHOD

RELATED APPLICATIONS

[0001] This application claims the benefit of co-pending U.S. Provisional Patent Application Ser. No. 61/419,480, filed on Dec. 3, 2010 for ENHANCED CREDIT CARD SECURITY.

BACKGROUND

[0002] 1. The Field of the Invention

[0003] This invention relates to financial transactions and, more particularly, to novel systems and methods for security codes for transactional cards, such as credit cards, ATM cards, gift cards, debit cards, and the like.

[0004] 2. The Background Art

[0005] It is increasingly common for people to transact business using transactional cards or financial cards, such as credit cards, ATM cards, gift cards, debit cards, other cards and the like, rather than cash or checks. Any reference to one of these forms is intended to refer to any and all types herein. One common security measure used to prevent fraud in such transactions is the use of a card verification value (CVV) or similar code to ensure that the person using a card is the card holder. A CVV may also be referred to as a card security code, card verification data, card verification value code, verification code, card code verification, or similar term. The use of the term "CVV" throughout this specification is intended to encompass all of the foregoing.

[0006] In credit transactions or other transactions in which payment is made by a credit card, a static CVV may assigned to the card and printed on the card. When a user completes a transaction, an exemplary method of verifying the card or account may include receiving the card number, expiration date, and CVV. In particular, a CVV may be required when a user makes an online purchase or is otherwise required to manually input card data. Additional identifying data may also be required in certain credit transactions and other financial transactions to verify the user's identity. For example, the user may be required to provide a name, address, zip code, personalized security information, response to a personal security question, password, or a combination thereof.

BRIEF SUMMARY OF THE INVENTION

[0007] In one aspect, a credit card, debit card, charge card, or other similar financial instrument is disclosed with the assignment of a dynamic CVV for increased card security. The dynamic CVV is rewritten to the card with each transaction. To facilitate online purchases, a static CVV may also be provided for manual entry. Hereinafter, any reference to a card or financial instrument includes transactional cards, electronic transaction cards, monetary cards, or generally financial cards, such as credit cards, ATM cards, gift cards, debit cards, and like financial instruments.

[0008] In one embodiment, a networked system of computers between a card issuer an merchants, or a plurality of both may operate to communicate dynamically security information that can actually be changed on a financial card in user.

[0009] In one embodiment of a method of verification, the method may include providing a financial card comprising a computer readable storage medium embedded in it. Then, providing a dynamic portion of the computer readable storage medium as a computer writable medium, may enable designating the dynamic portion as the storage location of a dynamic code to be selectively read from and written to the computer readable storage medium.

[0010] In use, receiving, by an issuer computer corresponding to an issuer of the financial card, transaction information from a first transaction in which the information from the financial card is presented as a form of payment may be followed by receiving, by the issuer computer, a first value of the dynamic code stored in the dynamic portion. Thereby verifying, by the issuer computer, the authenticity of the first transaction based at least in part on the receiving the first value, the codes are obsolete.

[0011] Therefore, such use and verification is followed by deleting, by the issuer computer, the first value after the verifying. The issuer computer then writes or causes an intermediate transaction device to write a second value of the dynamic code to the dynamic portion.

[0012] In some embodiments, the method includes the financial card being selected from a credit card, a debit card, a gift card, and a purchase order. Likewise, the method contemplates receiving, by the issuer computer, data representing presentation of the financial card to a second merchant in a second transaction subsequent to the first transaction. Thereafter, the computer can verify and authorize completion of the second transaction.

[0013] The method may involve receiving, by the financial card, during a second transaction, a third value for the dynamic code replacing the second value. The method may include the first transaction being completed by the financial card with a first merchant and a second transaction completed by the financial card with a second merchant.

[0014] Typically, the financial institution is independent from the first and second merchants, and the computer readable storage medium is non-volatile memory selected from magnetic media, optical media, flash media, and another solid state medium.

[0015] Some embodiments of a system and method may include receiving by the issuer computer, values of the dynamic code from a plurality of transactions corresponding to an authorized user of the financial card. Changing, by the issuer computer, the values of the dynamic code in accordance with a security scheme expiring the values based on instructions from the issuer computer may be followed by receiving an expired value of the dynamic code, representing a an unauthorized transaction by an unauthorized user. Thus the system fails any request for verification of the unauthorized transaction, based on the expired value.

[0016] One method may include providing a credit transaction system comprising the financial card, a transaction device in or connected to a computer. A first computer associated with a financial institution operating as an issuer of the financial card may be programmed to verify the authenticity of transactions based on the transaction device reading the dynamic code and reporting to the first computer based on the dynamic code.

[0017] It may be further programmed to send to the transaction device values to assign to the dynamic code, where the transaction device is configured to read and write to the financial card the dynamic code.

[0018] The credit transaction system may include a second computer corresponding to a merchant and operably connected to communicate with the first computer. With the second computer programmed to read from the financial card and provide to the second computer a first value correspond-

ing to the dynamic code, the first value may be read by the second computer from the financial card during a transaction. The second computer may be further programmed to receive from the first computer a second value corresponding to the dynamic code. Meanwhile, the second computer may be programmed to overwrite the first value on the financial card with the second value during the transaction.

[0019] A user may select a financial card comprising a computer readable storage medium embedded therein, wherein a dynamic portion of the computer readable storage medium is also a computer writable medium. The dynamic portion is the storage location of a dynamic code to be selectively read from and written to the computer readable storage medium.

[0020] In use, the card is presented to a merchant computer in communication with an issuer computer, the merchant computer corresponding to a merchant in a transaction with the financial card and the issuer computer corresponding to an issuer of the financial card, first transaction information corresponding to a first transaction in which the information from the financial card is presented as a form of payment. Delivering, by the financial card to the issuer computer, a first dynamic code from the dynamic portion is followed by receiving verification from the issuer computer of the authenticity of the first transaction, based at least in part on the delivering the first dynamic code. The financial card then receives, from the issuer computer, a second dynamic code replacing the first dynamic code from the dynamic portion.

[0021] A credit transaction system may also include a second computer corresponding to a merchant and operably connected to communicate with a first computer. The second computer may be programmed to read from the financial card and provide to the second computer a first value corresponding to the dynamic code. The first value is read by the second computer from the financial card during a transaction, or read by a transaction device and passed on to the second computer.

[0022] The second computer may be programmed to receive from the first computer a second value corresponding to the dynamic code and overwrite the first value on the financial card with the second value during the transaction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The foregoing features of the present invention will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only typical embodiments of the invention and are, therefore, not to be considered limiting of its scope, the invention will be described with additional specificity and detail through use of the accompanying drawings in which:

[0024] FIG. **1** is schematic block diagram of a networked computer system for implementing the invention;

[0025] FIG. **2** is a network-level diagram of a network for use of an enhanced-security credit card;

[0026] FIG. **3** is a front and rear view of a credit card;

[0027] FIG. **4** is a block diagram of an exemplary data structure on a credit card; and

[0028] FIG. **5** is a block diagram of an exemplary transaction device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] It will be readily understood that the components of the present invention, as generally described and illustrated in the drawings herein, could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of the embodiments of the system and method of the present invention, as represented in the drawings, is not intended to limit the scope of the invention, as claimed, but is merely representative of various embodiments of the invention. The illustrated embodiments of the invention will be best understood by reference to the drawings, wherein like parts are designated by like numerals throughout.

[0030] Referring to FIG. **1**, an apparatus **10** or system **10** for implementing the present invention may include one or more nodes **12** (e.g., client **12**, computer **12**). Such nodes **12** may contain a processor **14** or CPU **14**. The CPU **14** may be operably connected to a memory device **16**. A memory device **16** may include one or more devices such as a hard drive **18** or other non-volatile storage device **18**, a read-only memory **20** (ROM **20**), and a random access (and usually volatile) memory **22** (RAM **22** or operational memory **22**). Such components **14**, **16**, **18**, **20**, **22** may exist in a single node **12** or may exist in multiple nodes **12** remote from one another.

[0031] In selected embodiments, the apparatus **10** may include an input device **24** for receiving inputs from a user or from another device. Input devices **24** may include one or more physical embodiments. For example, a keyboard **26** may be used for interaction with the user, as may a mouse **28** or stylus pad **30**. A touch screen **32**, a telephone **34**, or simply a telecommunications line **34**, may be used for communication with other devices, with a user, or the like. Similarly, a scanner **36** may be used to receive graphical inputs, which may or may not be translated to other formats. A hard drive **38** or other memory device **38** may be used as an input device whether resident within the particular node **12** or some other node **12** connected by a network **40**. In selected embodiments, a network card **42** (interface card) or port **44** may be provided within a node **12** to facilitate communication through such a network **40**.

[0032] In certain embodiments, an output device **46** may be provided within a node **12**, or accessible within the apparatus **10**. Output devices **46** may include one or more physical hardware units. For example, in general, a port **44** may be used to accept inputs into and send outputs from the node **12**. Nevertheless, a monitor **48** may provide outputs to a user for feedback during a process, or for assisting two-way communication between the processor **14** and a user. A printer **50**, a hard drive **52**, or other device may be used for outputting information as output devices **46**.

[0033] Internally, a bus **54**, or plurality of buses **54**, may operably interconnect the processor **14**, memory devices **16**, input devices **24**, output devices **46**, network card **42**, and port **44**. The bus **54** may be thought of as a data carrier. As such, the bus **54** may be embodied in numerous configurations. Wire, fiber optic line, wireless electromagnetic communications by visible light, infrared, and radio frequencies may likewise be implemented as appropriate for the bus **54** and the network **40**.

[0034] In general, a network **40** to which a node **12** connects may, in turn, be connected through a router **56** to another network **58**. In general, nodes **12** may be on the same network **40**, adjoining networks (i.e., network **40** and neighboring network **58**), or may be separated by multiple routers **56** and multiple networks as individual nodes **12** on an internetwork. The individual nodes **12** may have various communication capabilities. In certain embodiments, a minimum of logical capability may be available in any node **12**. For example, each

node **12** may contain a processor **14** with more or less of the other components described hereinabove.

[0035] A network **40** may include one or more servers **60**. Servers **60** may be used to manage, store, communicate, transfer, access, update, and the like, any practical number of files, databases, or the like for other nodes **12** on a network **40**. Typically, a server **60** may be accessed by all nodes **12** on a network **40**. Nevertheless, other special functions, including communications, applications, directory services, and the like, may be implemented by an individual server **60** or multiple servers **60**.

[0036] In general, a node **12** may need to communicate over a network **40** with a server **60**, a router **56**, or other nodes **12**. Similarly, a node **12** may need to communicate over another neighboring network **58** in an internetwork connection with some remote node **12**. Likewise, individual components may need to communicate data with one another. A communication link may exist, in general, between any pair of devices.

[0037] Referring to FIGS. **1-5**, an apparatus **10** or system **10** of FIG. **1**, may embody multiple computers **12**, each with its own processors **14** and memory devices **16**. These may be networked together to host software implementing some, any, or all of the functions, relationships, and events discussed hereinbelow. Thus, each computer **12** may include any or all of the foregoing components and connections in order to implement the communications, data transfers, transactions, and the like as described.

[0038] Referring to FIGS. **1-5**, a credit card **120** with dynamic CVV **330** for enhanced card security will now be described with more particular reference to the attached drawings. Details are set forth by way of example to facilitate discussion of the disclosed subject matter and render apparent the structures and functions to a person of ordinary skill in the art, however, that the disclosed embodiments are exemplary and not exhaustive of all possible embodiments.

[0039] FIG. **2** illustrates an exemplary embodiment of a finance network. In the exemplary embodiment, the financial instrument is a credit card **120**, but could also be a debit card **120**, RFID device **120**, or other similar identification instruments configured to allow a user **110** to access funds, with the important criterion that it has a storage medium **220**, such as a portion of its magnetic strip **220** that is both readable and writable so that a dynamic CVV can be stored thereon.

[0040] Within this specification, the terms "financial card" **120** and "credit card" **120** are used as exemplary embodiments of a financial instrument **120**, but the usage is intended to be construed broadly to encompass any item or device configured to allow a user **110** to access funds.

[0041] For example, a plastic card **120** with a magnetic strip **220** is commonly used, with data electronically stored on the magnetic strip **220**. In other embodiments, a small keychain fob with RFID technology may be provided and serve a similar function. Other configurations include an RFID chip **220** embedded in a "smart card," with wireless communication capabilities. In another contemplated embodiment, a plastic card **120** may be provided with electrical pads or leads configured to interface with a USB or similar data slot. Data may be stored on flash or some other similar non-volatile storage medium.

[0042] Those having skill in the art will appreciate that there are many other structural variations possible for a financial card **120**. The term is intended broadly to encompass any physical token or data structure by which user a **110** may access an account with a financial institution **150**.

[0043] In the exemplary embodiment, a user **110** has an account with a financial institution **150**. The financial institution **150** issues a card **120** to cardholder **110**. For example, the financial institution **150** may be a bank, credit union, brokerage, or other similar service provider.

[0044] When a user **110** wants to access an account with the financial institution **150**, he or she may use the card **120** with a transaction device **130**. The transaction device **130** may be operated by a merchant or other entity to which the user **110** wants to transfer money. It may be, for example, a credit card reader **130** or other similar device **130**. Transaction device **130** may use a network **140** such as the internet **130** to communicate with the financial institution **150**.

[0045] The network **140** may be, for example, a LAN, WAN, Wi-Fi, an internetwork of LANs, the Internet, or another communication network providing a data link between the transaction device **130** and the financial institution **150**. In some embodiments, the network **140** will include security protocols, such as transport layer security (TLS) or other encryption technology.

[0046] FIG. **3** illustrates an exemplary embodiment of a financial card **120**. The exemplary financial card **120** has a front side **212** or face **212** and a reverse side **214** or back **214**. On the exemplary front side **212** is useful information such as a financial institution name **240**, a card number **270**, an expiration date **260**, and a user's **110** name **250**. On the reverse side **214** there may be additional information, such as a CVV **230** and a signature **280** of the user **110**. Those having skill in the art will recognize that each of these items is optional, and the arrangement may be varied without affecting the function of the card **120**.

[0047] Also on reverse side **214** is a magnetic strip **220**. The magnetic strip **220**, or its functional equivalent, is the most useful feature of the card. It is common for a magnetic strip **220** to be rewritable. The magnetic strip **220** is a commonly-used exemplary data storage medium. In other embodiments, other data storage media may be used such as optical, holographic, or the like. For example, some credit cards are now equipped with RFID chips, or other electronic storage media. Furthermore, in some cases, devices such as RFID equipped key fobs or even biometric indicators may take the place of the card **120**.

[0048] FIG. **4** is a diagrammatic view of a card data structure that may be encoded on the magnetic strip **220** of financial card **210**. In this exemplary embodiment, the magnetic strip **220** is divided into up to three tracks, known respectively as track **1**, track **2**, and track **3**. In common usage, both track **1** and track **2** will include the minimum information needed to process the card. The data structure of FIG. **4** discloses exemplary track **1** data. Track **1** is provided as an exemplary embodiment of a card data structure, but those having skill in the art will recognize that the possibilities for card data structures are infinite.

[0049] According to this embodiment, track **1** begins with a start sentinel **312**, which in the exemplary embodiment is a "%" character. Next is a one character format code **314**. Next is a primary account number **316**, which may be up to 19 characters long. Next is a field separator **318**, which in the exemplary embodiment is a "^" character. Next is the cardholder name **320**, which may be up to 26 characters. Next is another field separator **322**, followed by a four digit expiration date **324**. Next is a three digit service code **326**. The last substantive filled is discretionary field **330**, followed by end sentinel **332**, which in the exemplary embodiment is a "?"

character. Finally a one character longitudinal redundancy check (LRC) **334**, is computed according to any suitable methods known in the computer and software art.

[0050] In the exemplary embodiment, the discretionary field **330** is encoded with the dynamic CVV **330**. For increased security and reliability, other fields of the card data structure may be write protected. Thus, the dynamic CVV **330** contained in the discretionary field **330** is the only re-writable portion of the card data strip **220**.

[0051] FIG. **5** is a block diagram of an exemplary embodiment of a transaction device **130**. The transaction device **130** may be a credit card reader **130**, debit card reader **130**, ATM **130**, or other computer system **130** equipped with an appropriate interface for reading from and writing to a magnetic strip **220**. The transaction device **130** is controlled by a processor **410**. A processor **410** may be a microprocessor **410**, microcontroller **410**, or any other similar programmable logic device **410** configured to control the transaction device **130**.

[0052] A processor **410** may be communicatively coupled to other system components via bus **470**. The processor **410** may have connected thereto a memory device **420**. In some embodiments, the memory device **420** may be connected to a processor **410** via the bus **470**. In other embodiments, the processor **410** may be directly connected to the memory device **420** for direct memory access. Memory **420** may be low-latency, random-access memory (RAM) or other similar low-latency main memory **420**.

[0053] The processor **410** is also connected to a network interface **460** such as a NIC card. The network interface **460** provides communication with the network **140**. The processor **410** may also be connected to a computer-readable storage medium **430**. In some embodiments, storage **430** may be a nonvolatile storage medium **430**. It and may be a memory device **430** based on technology with higher capacity but also higher latency than the memory **420**. Storage **430** may be a hard disk **430**, flash disk **430**, or other suitable nonvolatile storage medium **430**. In some embodiments, the functions of the storage **430** and the memory **420** may be combined in a single memory device.

[0054] The processor **410** is also communicatively coupled to a magstrip interface **440**. The magstrip interface **440** is configured to allow the processor **410** to read a magnetic strip **220**, and also to rewrite magnetic data on the magnetic strip.

[0055] The magstrip interface **440** is provided as an exemplary embodiment of a financial card interface. In other embodiments, other technologies may be used. For example, an RFID interface may be used to communicate with "smart cards" equipped with RFID technology. In another exemplary embodiment, the financial card **120** is equipped with electrical leads for providing a USB or other similar data interface. The card **120** may be provided with flash or other non-volatile memory for storing the card data.

[0056] Because the transaction device **130** is required to both read from and write to the magnetic strip **220** of the card **120**, prior art card readers in which a card is "swiped" may be cumbersome. To facilitate the write operation, the card **120** may have to be swiped twice. For increased simplicity, it may be preferable to instead use a transaction device **130** where the card **120** is fully or partially inserted, so that the magnetic strip can be both read and written as necessary. In other embodiments, wireless communication technology like RFID completely obviates the need for a physical interface between card **120** and transaction device **130**.

[0057] In an exemplary method of the present disclosure, a user **110** holds the card **120**, and desires to purchase goods or services from a merchant operating the transaction device **130**. To pay for the goods or services, the user **110** interacts with the transaction device **130**. For example, this may be done by inserting the card **120** into a magnetic card reader **130** or placing an RFID-equipped card near transaction device **130**.

[0058] The transaction device **130** reads the card data structure **310** from the card **120**, and transmits verification data, including the dynamic CVV **330**, across the network **140** to the financial institution **150**.

[0059] The financial institution **150** then authenticates the verification data, including the dynamic CVV **330**, and transmits a verification code, including a new dynamic CVV **330** to the transaction device **130**.

[0060] The transaction device **130** reads the new dynamic CVV **330**, and writes the new CVV **330** to the magnetic strip **220**. The transaction device **130** may then read the dynamic CVV **330** back from the magnetic strip **220** to verify that the updated CVV **330** has been properly written to magnetic strip **220**.

[0061] Finally, the transaction device **130** may transmit a success code to the financial institution **150** via the network **140**. The success code informs the financial institution **150** that the card **120** has been successfully updated with the new dynamic CVV **230**. This ensures that the card **120** is ready for its next use.

[0062] The financial institution **150** may then update its database to expire the previous dynamic CVV **330**, and enter the new dynamic CVV **330** as the valid dynamic CVV **330**. To ensure that the card **120** is updated with the new dynamic CVV **330**, a financial institution **150** may choose not to provide a final authorization code for the transaction until the success code is received.

[0063] Thus, if a card **120** is not successfully updated with the new CVV **330**, the old CVV **330** may remain valid. However, the attempted transaction still fails. This prevents a malicious actor from successfully completing several transactions by transmitting the old dynamic CVV **330** and then declining to transmit the success code. For additional security, but at the cost of some amount of lost convenience, a failure to receive the success code may instead result in flagging the account as having encountered a problem. This results in the system treating the card as invalid until the problem is resolved.

[0064] Referring to FIGS. **1-4**, the present device and method in accordance with the invention for enhanced credit security and card security. In certain embodiments, a dynamic CVV **230** may be used in lieu of or in addition to the static CVV **330** printed on the card **120**, and may help to prevent credit card fraud. In one exemplary embodiment, a credit card **120** is provided with a magnetic strip **220**, which can be both read and written by a transaction device **130**. The transaction device **130** may be, for example, a credit card reader, automated teller machine (ATM), or other similar device.

[0065] The transaction device **130** is configured to read a data track, which may include a CVV **330** or other additional dedicated code, from the magnetic strip. They transaction device transmits some or all of the information to a financial institution with which the user has an account. The financial institution receives the account data, and may respond by authorizing the transaction. It may also provide a new CVV **330** to the transaction device. The transaction device **130** may

then replace the CVV **330** on the data track with the new CVV **330**. Once the new CVV **330** has been provided, the old CVV **330** expires and is no longer valid.

[0066] If a malicious actor reads and stores the data from the magnetic strip **220**, including the CVV **230** in the discretionary field **330** (the dynamic CVV **330**, the malicious actor's ability to cause harm to the user will be reduced, because the dynamic CVV **230** will be valid only once. If the authorized user **110** uses the card **120** before the malicious actor attempts to use the information, the dynamic CVV **330** that the malicious actor reads will have expired, and the transaction will be rejected.

[0067] On the other hand, if the malicious actor is able to use the data before the user **110** completes another transaction with the card **120**, the user's attempt to use the card will be rejected, as the user's own card **120** will now have an expired CVV **330**. This will alert the user that there is a problem with the card **120** and motivate him or her to contact the financial institution **150** to resolve the issue.

[0068] The financial institution **150** may also limit its own damage by immediately closing off access to the account once any expired CVV **330** is presented to be used.

[0069] Furthermore, even if the malicious user is using a properly-configured transaction device **130** that will receive and store a new dynamic CVV **330** with each fraudulent transaction, malicious activity will be severely limited, because each transaction will need to be sent from the unauthorized device. The malicious user would also need to have an existing account with a credit card clearing house, so that identifying, tracking, and finding the malicious user is greatly simplified.

[0070] Because the use of a dynamic CVV **330** may limit the malicious actor to a single unauthorized transaction, investigation of credit card fraud will be greatly simplified. Furthermore, financial harm to both the user **110** and the financial institution **150** will be limited.

[0071] In some embodiments, a dynamic CVV **330** may completely replace the static CVV **230**, which in the prior art is printed on the card. One purpose of printing the static CVV **230** on the card is so that the CVV **230** can be used to verify purchases where card data are entered manually.

[0072] For example, if the user **110** is shopping online, he or she may not have a transaction device **130** available. Instead, manually typing in credit card data may be required to complete the transaction. In one embodiment, a static CVV **230** is printed on the card and it is retained as perpetually valid only for purchases where card data are input manually. It may also be used as a seed or as a cryptographic key coordinated with the dynamic CVV **330**. Transactions from a transaction device are required to use the dynamic CVV encoded on the magnetic strip. This configuration may represent an acceptable compromise between security and ease-of-use.

[0073] Many malicious actors (e.g., thieves, unauthorized users, etc.) acquire credit card data by using unauthorized card readers. For example, a retail sales clerk may receive a user's credit card, and surreptitiously swipe the card twice-once on an authorized card reader, and once on an unauthorized card reader. Alternatively, "dummy" ATM interfaces may be installed over valid ATMs **130**, so that a card's data is read by the unauthorized reader as well as the valid ATM reader **130**. Such methods permit malicious actors to unobtrusively mine customers' credit card numbers. With the use of a dynamic CVV **330**, this operation becomes less practical. The malicious actor would have to manually write down the static CVV **230** for each card, and also have a way of consistently correlating handwritten CVVs **230** with individual cards. In this exemplary embodiment, the static CVV **230** is never encoded on the magnetic strip **220**, so there is no way for the malicious actor to automatically and reliably mine static CVV's **230**.

[0074] In another exemplary embodiment, security can be further enhanced by not providing a static CVV **230** on the card **120** at all. For example, when the card **120** is provided to the user, it may be provided without any static CVV **230** printed thereon. Instead, the user **110** may be separately informed of a static CVV **230** that can be used for manual input. The user may memorize the static CVV **230**, similar to memorizing a pin for a debit card **120**, or the user may be provided with a printed reminder of the static CVV **230**. For example, a plain paper card **120** may be provided along with the traditional credit card. The use of a plain paper card, which is immediately visually and physically different from a traditional credit card **120** will help to prevent confusion between the card with the static CVV, and the traditional credit card **120** with the dynamic CVV **330**. The paper card may have printed thereon the account number, expiration date, and static CVV. The user can use the plain paper card for online purchases or other manual entry purposes.

[0075] For enhanced security, the credit card number provided with the plain paper card, including the static CVV, may be a separate number from the number provided on the traditional credit card. In other embodiments, the CVV **230** may be a dummy never to be used. Its use constitutes an alert that the use of the card **120** is improper.

[0076] As an additional service, the financial institution **150** may separately track purchases made with the static CVV **230**, and those made with the dynamic CVV **330**. For yet additional security, the plain paper card with a static CVV **230** may be provided without additional identifying information, such as the user's name. This will help to prevent fraud if the plain paper card is lost. For example, if verification requires providing a name, as it appears on the card, in addition to the card number **316**, expiration date **324**, and CVV **230**, a malicious actor who finds a lost plain paper card will not have the necessary data available for use.

[0077] Additional security features may also be provided to supplement use of the dynamic CVV **330**. For example, because it is normally expected that a static CVV **230** will be used less frequently than a dynamic CVV **330**, the financial institution may required each static CVV **230** transaction to be independently verified, such as by email or text message to an address or phone number on file.

[0078] For greater convenience, the user **110** may be allowed to pre-authorize a static CVV **230** transaction. For example, if a user knows he is planning to buy some online products, and that he will be spending $100 or less, he may pre-authorize a static CVV **230** transaction by sending an e-mail or text message, or logging in to a web interface. The user may have the option to set a maximum value for the pre-authorization, such as $100 in this case, and may set an expiration time, such as one hour.

[0079] Another supplementary security feature may be based on location. For example, because a dynamic CVV **330** can be valid for only one physical card, a transaction may be flagged as suspicious or invalid if the dynamic CVV **330** is used within a short time at two geographically distant points.

[0080] In one example, a user located in Oklahoma may have his card data compromised in New York. When the user

returns home to Oklahoma, two transactions may be attempted in a very short time, one from Oklahoma, the other from New York. One of these transactions will have an invalid CVV **330** and will fail anyway. But the presence of these two transactions may cause the account to be flagged, requiring the user **110** to contact the financial institution **150** before any more transactions are authorized.

[0081] The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative, and not restrictive. The scope of the invention is, therefore, indicated by the appended claims, rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed and desired to be secured by United States Letters Patent is:

1. A method of verification comprising:
providing a financial card comprising a computer readable storage medium embedded therein;
providing a dynamic portion of the computer readable storage medium as a computer writable medium;
designating the dynamic portion as the storage location of a dynamic code to be selectively read from and written to the computer readable storage medium;
receiving, by an issuer computer corresponding to an issuer of the financial card, transaction information from a first transaction in which the information from the financial card is presented as a form of payment;
receiving, by the issuer computer, a first value of the dynamic code stored in the dynamic portion;
verifying, by the issuer computer, the authenticity of the first transaction based at least in part on the receiving the first value;
deleting, by the issuer computer, the first value after the verifying; and
writing, by the issuer computer, a second value of the dynamic code to the dynamic portion.

2. The method of claim **1**, wherein the financial card is selected from a credit card, a debit card, a gift card, and a purchase order.

3. The method of claim **1**, further comprising:
receiving, by the issuer computer, data representing presentation of the financial card to a second merchant in a second transaction subsequent to the first transaction; and
verifying and authorizing, by the issuer computer, completion of the second transaction.

4. The method of claim **1**, further comprising:
receiving, by the financial card, during a second transaction, a third value for the dynamic code replacing the second value.

5. The method of claim **1**, wherein:
the first transaction is completed by the financial card with a first merchant;
a second transaction is completed by the financial card with a second merchant; and
the financial institution is independent from the first and second merchants.

6. The method of claim **1**, wherein the computer readable storage medium is non-volatile memory.

7. The method of claim **6**, wherein the non-volatile memory is selected from magnetic media, optical media, flash media, and another solid state medium.

8. The method of claim **1**, further comprising:
receiving by the issuer computer, values of the dynamic code from a plurality of transactions corresponding to an authorized user of the financial card;
changing, by the issuer computer, the values of the dynamic code in accordance with a security scheme expiring the values based on instructions from the issuer computer; and
receiving, by the issuer computer, an expired value of the dynamic code, representing a an unauthorized transaction by an unauthorized user;
failing, by the financial card, a request for verification of the unauthorized transaction, based on the expired value.

9. The method of claim **1**, further comprising:
providing a credit transaction system comprising
the financial card;
a transaction device;
a first computer associated with a financial institution operating as an issuer of the financial card;
the first computer programmed to verify the authenticity of transactions based on the transaction device reading the dynamic code and reporting to the first computer based on the dynamic code;
the first computer, further programmed to send to the transaction device values to assign to the dynamic code; and
the transaction device configured to read and write to the financial card the dynamic code.

10. The method of claim **9**, wherein the credit transaction system further comprises:
a second computer corresponding to a merchant;
the second computer operably connected to communicate with the first computer;
the second computer programmed to read from the financial card and provide to the second computer a first value corresponding to the dynamic code, the first value being read by the second computer from the financial card during a transaction;
the second computer, further programmed to receive from the first computer a second value corresponding to the dynamic code; and
the second computer, further programmed to overwrite the first value on the financial card with the second value during the transaction.

11. A method of financial certification comprising:
selecting a financial card comprising a computer readable storage medium embedded therein;
the selecting, wherein a dynamic portion of the computer readable storage medium is also a computer writable medium;
the selecting, wherein the dynamic portion is the storage location of a dynamic code to be selectively read from and written to the computer readable storage medium;
presenting to a merchant computer in communication with an issuer computer, the merchant computer corresponding to a merchant in a transaction with the financial card and the issuer computer corresponding to an issuer of the financial card, first transaction information corresponding to a first transaction in which the information from the financial card is presented as a form of payment;
delivering, by the financial card to the issuer computer, a first dynamic code from the dynamic portion;

receiving verification from the issuer computer of the authenticity of the first transaction based at least in part on the delivering the first dynamic code; and

receiving, by the financial card, from the issuer computer, a second dynamic code replacing the first dynamic code from the dynamic portion.

12. The method of claim **11**, further comprising:

presenting the financial card to a second merchant in a second transaction subsequent to the first transaction; and

completing successfully the second transaction.

13. The method of claim **12**, further comprising:

receiving, by the financial card, during the second transaction, a third dynamic code replacing the second dynamic code.

14. The method of claim **13**, wherein the issuer is a financial institution independent from the first and second merchants.

15. The method of claim **14**, wherein the financial card is selected from a credit card, a debit card, a gift card, and a purchase order.

16. The method of claim **15**, wherein the computer readable storage medium is non-volatile memory.

17. The method of claim **16**, wherein the non-volatile memory is selected from magnetic media, optical media, flash media, and another solid state medium.

18. The method of claim **17**, further comprising:

presenting, by an unauthorized user, the financial card to a third merchant in association with a third transaction;

presenting to the issuer computer, by the financial card, the third dynamic code;

failing, by the financial card, a verification by the issuer computer during the third transaction, based on an expiration of the third dynamic code.

19. A credit transaction system comprising:

a financial card;

a transaction device;

a first computer associated with a financial institution operating as an issuer of the financial card;

the financial card, further provided with a computer readable storage medium storing a dynamic code;

the first computer programmed to verify the authenticity of a transaction based on the transaction device reading the dynamic code and reporting to the first computer based on the dynamic code;

the first computer, further programmed to send to the transaction device values to assign to the dynamic code; and

the transaction device configured to read and write to the financial card the dynamic code.

20. The credit transaction system further comprising:

a second computer corresponding to a merchant;

the second computer operably connected to communicate with the first computer;

the second computer programmed to read from the financial card and provide to the second computer a first value corresponding to the dynamic code, the first value being read by the second computer from the financial card during a transaction;

the second computer, further programmed to receive from the first computer a second value corresponding to the dynamic code; and

the second computer, further programmed to overwrite the first value on the financial card with the second value during the transaction.

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