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Electronic authorization system and method

Abstract

An electronic authorization system comprising a data source system configured to transmit transaction data. A secure data system is coupled to the data source system over an open network, the secure data system is configured to receive the transaction data from the data source system, generate a unique encrypted identifier for the transaction data and to transmit the unique encrypted identifier to the data source system. The data source system is configured to receive the unique encrypted identifier and replace payment card data associated with the transaction data in a database with the unique encrypted identifier.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) This patent application is a .Iadd.reissue of U.S. patent application Ser. No. 15/451,070, filed Mar. 6, 2017, now issued on Jun. 2, 2020 as U.S. Pat. No. 10,673,824, which is a .Iaddend.continuation of U.S. patent application Ser. No. 14/276,916, filed May 13, 2014, now .Iadd.issued on Mar. 7, 2017 as .Iaddend.U.S. Pat. No. 9,589,257, which is a divisional of U.S. patent application Ser. No. 13/859,724, filed Apr. 9, 2013, now .Iadd.issued on Apr. 9, 2013 as .Iaddend.U.S. Pat. No. 8,726,018, which is a divisional of U.S. patent application Ser. No. 13/221,719, filed Aug. 30, 2011, now .Iadd.issued on Apr. 9, 2013 as .Iaddend.U.S. Pat. No. 8,417,947, which is a divisional of U.S. patent application Ser. No. 12/250,336, filed Oct. 13, 2008, now .Iadd.issued on Apr. 30, 2011 as .Iaddend.U.S. Pat. No. 8,010,791, which is a continuation of U.S. patent application Ser. No. 11/366,189, filed Mar. 2, 2006, now .Iadd.issued on Nov. 11, 2008 as .Iaddend.U.S. Pat. No. 7,451,481, which claims priority to U.S. Provisional Application Ser. No. 60/676,681, filed Apr. 29, 2005, each of which are hereby incorporated by reference for all purposes as if set forth in its entirety.

FIELD OF THE INVENTION
(1) The present invention pertains to the field of database systems, and more particularly to a database system and method for encryption and protection of confidential information that uses a unique surrogate identifier for confidential information that is stored on devices that are accessible over an open network.

BACKGROUND OF THE INVENTION
(2) Data communications channels such as computer networks have varying degrees of security. Some computer networks, such as the Internet, are open to a large number of users. Computers that are connected to these networks may be subject to attack from third parties that want access to

confidential information that is stored on the computers. This problem can be exacerbated when the confidential information is third party confidential information that is only used for short periods of time and which is then stored for future use, such as personnel data, medical data, business data, financial data, or other data.

(3) Although firewalls and other security devices can be used to provide some protection, active monitoring of network state and data flows is required to provide the highest level of security. However, most businesses cannot afford to provide such high levels of security.

SUMMARY OF THE INVENTION

(4) In accordance with the present invention, an electronic authorization system is provided that overcomes known problems with encryption and protection of confidential data.

(5) In particular, an electronic authorization system is provided that does not require confidential data to be stored in a manner where it is accessible over an open network.

(6) In accordance with an exemplary embodiment of the present invention, an electronic authorization system comprising a data source system configured to transmit transaction data. A secure data system is coupled to the data source system over an open network, the secure data system is configured to receive the transaction data from the data source system, generate a unique encrypted identifier for the transaction data and to transmit the unique encrypted identifier to the data source system. The data source system is configured to receive the unique encrypted identifier and replace payment card data associated with the transaction data in a database with the unique encrypted identifier.

(7) The present invention provides many important technical advantages. One important technical advantage of the present invention is a system and method for managing merchant payment transaction processing accounts that allows a user to obtain pricing information without giving the user access to proprietary information, such as tiered pricing structures that are developed using knowledge that has been accumulated for classes of merchants.

(8) Those skilled in the art will further appreciate the advantages and superior features of the invention together with other important aspects thereof on reading the detailed description that follows in conjunction with the drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a diagram of a database system for encryption and protection of confidential data in accordance with an exemplary embodiment of the present invention; and

(2) FIG. **2** is a flow chart of a method for encryption and protection of confidential data.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

(3) In the description that follows, like parts are marked throughout the specification and drawings with the same reference numerals, respectively. The drawing figures might not be to scale, and certain components can be shown in generalized or schematic form and identified by commercial designations in the interest of clarity and conciseness.

(4) FIG. **1** is a diagram of a database system **100** for encryption and protection of confidential data in accordance with an exemplary embodiment of the present invention. System **100** allows a computer on an open network to perform functions with confidential information without requiring that computer to store the confidential information so as to protect the confidential information from misappropriation.

(5) Database system **100** includes data source system **102**, secure data network interface system **104**, secure data network **106** and secure data storage system **108**, each of which can be implemented in hardware, software, or a suitable combination of hardware and software, and which can be one more software systems operating on a suitable processing platform. As used herein, a

hardware system can include a suitable general purpose processor, an application specific integrated circuit, a field programmable gate array, or other suitable systems. A software system can include one or more objects, agents, threads, lines of code, subroutines, separate software applications, two or more lines of code or other suitable software structures operating in two or more software applications or on two or more processors, or other suitable software structures. In one exemplary embodiment, a software system can include one or more lines of code or other suitable software structures operating in a general purpose software application, such as an operating system, and one or more lines of code or other suitable software structures operating in a specific purpose software application.

(6) Data source system **102** receives confidential data Ci and first associated data Da**1**. Confidential data Ci can be confidential business data, personal data, financial data, technical data, or other suitable data. First associated data Da**1** can be non-confidential data that is associated with the confidential data, such as a file structure that has had all confidential data removed, a record identifier, a transaction identifier, or other suitable data. Confidential data Ci and first associated data Da**1** is then provided to secure data network **106** through secure data network interface system **104**, and first associated data Da**1**, unique encrypted identifier Ei, second associated data Da**2** without confidential data Ci is received in response. Data source system **102** stores first associated data Da**1**, unique encrypted identifier Ei, second associated data Da**2** without confidential data Ci, so as to prevent unwanted access to confidential data Ci at data source system **102** over open network **128**. In one exemplary embodiment, data source system **102** stores the unique encrypted identifier Ei until a predetermined period of time has elapsed.

(7) In another exemplary embodiment, data source system **102** requests additional data DaN from secure data network **106** through secure data network interface system **104** using the unique encrypted identifier Ei, and secure data network interface system **104** translates unique encrypted identifier Ei to confidential information Ci for transmission over secure data network **106**. This request can be made by sending a structured request that contains only that information, a sequence of messages with that information, fields within an existing data format (such as the VISAD data format) with that information, encrypted or unencrypted, or in other suitable manners. In one exemplary embodiment, secure data network interface system **104** translates confidential information Ci using unique encrypted identifier Ei to transmit the additional data DaN to data source system **102** over open network **128**. In this exemplary embodiment, data fields in a pre-existing or proprietary data format that are blank, filler fields, or unassigned can be used to indicate that the message contains a request to translate Ei to Ci, so as to allow systems that are configured to process the pre-existing or proprietary data formats to also process the translation requests. Data source system **102** can also store the unique encrypted identifier Ei until a predetermined period of time has elapsed, until a predetermined period of time has elapsed after additional data DaN is received from secure data network **108**.

(8) Settlement data substitution system **112** transmits a settlement request Sr and unique encrypted identifier Ei to secure data network interface system **104** and receiving a settlement confirmation Sc and unique encrypted identifier Ei from secure data network interface system **104**. This request can be made by sending a structured request that contains only that information, a sequence of messages with that information, fields within an existing data format (such as the VISAD data format or a proprietary data format) with that information, encrypted or unencrypted, or in other suitable manners. Data fields in a pre-existing or proprietary data format that are blank, filler fields, or unassigned can be used to indicate that the message contains Sr and Ei or to receive Sc and Ei, so as to allow systems that are configured to process the pre-existing or proprietary data formats to also process the settlement requests.

(9) Reporting data substitution system **114** allows reporting data to be generated using unique encrypted identifier Ei. In one exemplary embodiment, data source system **102** provide unique encrypted identifier Ei to secure data network interface system **104** with report request Rr, and

secure data network interface system **104** and secure data network **106** generate a report based on unique encrypted identifier Ei and report request Rr. This request can be made by sending a structured request that contains only that information, a sequence of messages with that information, fields within an existing data format (such as the VISAD data format or a proprietary data format) with that information, encrypted or unencrypted, or in other suitable manners. Data fields in a pre-existing or proprietary data format that are blank, filler fields, or unassigned can be used to indicate that the message contains Rr and Ei or to receive the report, so as to allow systems that are configured to process the pre-existing or proprietary data formats to also process the settlement requests.

(10) Exception data substitution system **116** receives exception data Dd and unique encrypted identifier Ei from secure data network interface system **104** and transmits exception response data Dr to secure data network interface system **104** in response to exception data Dd. Exception data substitution system **116** receives a transaction identifier Ti, exception category data Dc and the unique encrypted identifier Ei from secure data network interface system **104** and transmits biometric data Bd to secure data network interface system **104** in response to the transaction identifier Ti, the exception category data Dc and the unique encrypted identifier Ei. This request can be made by sending a structured request that contains only that information, a sequence of messages with that information, fields within an existing data format (such as the VISAD data format or a proprietary data format) with that information, encrypted or unencrypted, or in other suitable manners. Data fields in a pre-existing or proprietary data format that are blank, filler fields, or unassigned can be used to indicate that the message contains Dr or Bd and to receive Dc, so as to allow systems that are configured to process the pre-existing or proprietary data formats to also process the settlement requests.

(11) Secure data network interface system **104** receives confidential data Ci and first associated data Da**1** from data source system **102**, stores confidential data Ci and first associated data Da**1** in secure data storage system **108**, and interfaces with systems over secure data network **106** to obtain second associated data Da**2**. In one exemplary embodiment, secure data network interface system **104** can access frame relay connections, dedicated communications lines, or other secure data communications media to obtain second associated data Da**2** in response to the confidential data Ci and first associated data Da**1**, additional data DaN in response to subsequent queries, or other suitable data. Secure data network interface system **104** provides unique encrypted identifier Ei and second associated data Da**2** to data source system **102** over open network **128**.

(12) Secure data network interface system **104** includes data association system **118**, authorization system **120**, settlement system **122**, reporting system **124** and data encryption system, each of which can be implemented in hardware, software or a suitable combination of hardware and software, and which can be one or more software systems operating on a general purpose processing platform. Secure data network interface system **104** can receive a structured request that only contains information from one or more systems of data source system **102**, a sequence of messages with that information, fields within an existing data format (such as the VISAD data format or a proprietary data format) with that information, encrypted or unencrypted, or in other suitable manners. Data fields in a pre-existing or proprietary data format that are blank, filler fields, or unassigned can be used to indicate that the message contains data from one or more of the systems of data source system **102**, or to transmit data to those systems, so as to allow systems that are configured to process the pre-existing or proprietary data formats to also process the settlement requests.

(13) Data association system **118** associates the confidential data Ci with unique encrypted identifier Ei and stores confidential data Ei, first associated data Da**1** and unique encrypted identifier Ei in secure data storage system **108**. In one exemplary embodiment, unique encrypted identifier Ei can be keyed to some or all of the data in first associated data Da**1**, confidential data Ci, both Ei and Ci, state data that indicates whether data has been received from data source system

102, secure data network **106**, or other suitable sources, or other suitable data. Data association system **118** also receives second associated data Da**2**, associates second associated data Da**2** with confidential data Ci, first associated data Da**1** and unique encrypted identifier Ei, and stores confidential data Ci, first associated data Da**1** and unique encrypted identifier Ei in secure data storage system **108**.

(14) Authorization system **120** performs authorization using the confidential information Ci and the first associated data Da**1**. In one exemplary embodiment, authorization system **120** can send an authorization request Ar to secure data network **106**, and can receive an authorization indicator Ai that identifies whether authorization was approved or denied, the reason why authorization was denied, a request for additional information, or other suitable data.

(15) Settlement system **122** performs settlement using the confidential information Ci and the first associated data Da**1**. In one exemplary embodiment, settlement system **122** can send a settlement request Sr to secure data network **106**, and can receive settlement data Sd that identifies whether settlement was processed or denied, the reason why settlement was denied, a request for additional information, or other suitable data.

(16) Reporting system **124** provides reporting functions using unique encrypted identifier Ei, confidential data Ci, first associated data Da**1**, second associated data Da**2**, additional data DaN, or other suitable data. In one exemplary embodiment, reporting system **124** can receive a plurality of unique encrypted identifiers and can obtain the corresponding confidential data Ci, first associated data Da**1**, second associated data Da**2**, authorization request Ar, authorization indicator Ai, settlement request Sr, settlement data Sd, or other suitable data, and can generate reports based on the types of data specified, available data, or other suitable data.

(17) Data encryption system **126** generates a unique encrypted identifier Ei for confidential data Ci. In one exemplary embodiment, the unique encrypted identifier Ei can have the same data format as the confidential information, so as to allow the data source system to operate without modification. In this exemplary embodiment, the data source system can store the unique encrypted identifier Ei as if it were the unencrypted confidential information, so as to allow the use of the unique encrypted identifier Ei to be seamlessly transparent to the user of data source system **102**. Likewise, suitable systems can be used to interface with existing systems of data source system **102** so as to locally translate the unique encrypted identifier Ei, to modify the systems of data source system **102** to accept a unique encrypted identifier Ei that has a different size or data structure than the confidential data Ci, or to perform other suitable functions.

(18) Secure data storage system **108** is coupled to secure data network interface system **104**, and is isolated from open network **128**. In one exemplary embodiment, secure data storage system **108** can be isolated from secure data network interface system **104** by a dedicated communications medium, one or more firewalls, and can have other suitable security measures, such as active monitoring for security threats. As such, the level of security that can be provided using secure data storage system **108** is much greater than is typically provided for data source system **102**.

(19) Secure data network **106** is coupled to secure data network interface system **104**, receives the confidential data Ci and the first associated data Da**1**, and generates second associated data Da**2**. Secure data network **106** provides second associated data Da**2** to secure data network interface system **104**.

(20) In operation, database system **100** allows confidential information Ci to be used over an open network without the need to store the confidential information in a data storage device that is accessible over the open network. In this manner, data source systems can receive confidential medical data, financial data, personal data, or other suitable data and can perform a variety of functions using the confidential data without the need to store the confidential data or otherwise incur costs for protecting the confidential data from third parties.

(21) FIG. **2** is a flow chart of a method **200** for encryption and protection of confidential data. Method **200** begins at **202** where confidential data Ci and first associated data Da**1** is received, such

as at a data source system. The method then proceeds to **204** where the confidential data Ci and the first associated data Da**1** is transmitted from the data source system over an open network to a data network interface system. The method then proceeds to **206**.

(22) At **206**, confidential data Ci and first associated data Da**1** is received at a secure data network interface system, and it is determined at **208** whether Ci and Da**1** are internally consistent. In one exemplary embodiment, confidential data Ci and first associated data Da**1** can have a predetermined structure with alpha and numeric fields, predetermined field values, address data, or other suitable data, and it can be determined whether the data is internally consistent. If the data is not internally consistent, the method proceeds to **210** and an error is returned. Otherwise, the method proceeds to **212** where Ci and Da**1** are stored in a secure data storage system that is coupled to the data network interface system and isolated from the open network. The method then proceeds to **214**.

(23) At **214**, confidential data Ci and first associated data Da**1** is transmitted to a secure data network. At **216**, second associated data Da**2** is generated at the secure data network in response to confidential data Ci and first associated data Da**1**. In exemplary embodiments, second associated data Da**2** can be medical claim data, financial data, credit card authorization data, funds transfer data, national security data, crime enforcement data, or other suitable data. The method then proceeds to **218** where the second associated data Da**2** is received from the secure data network at the secure data network interface system. At **220**, unique encrypted identifier Ei is generated, such as based on confidential data Ci, first associated data Da**1** and second associated data Da**2**, or other suitable data. In exemplary embodiments, the format of the unique encrypted identifier Ei can be the same as the format of the confidential data Ci, the content of the data fields of Ei can be generated from the content of Da**1** and Da**2**, or other suitable processes can be used. The method then proceeds to **22**.

(24) At **222**, second associated data Da**2** is associated with the confidential data Ci, the first associated data Da**1**, and the unique encrypted identifier Ei at the secure data network interface system. The confidential data Ci, first associated data Da**1**, second associated data Da**2**, and the unique encrypted identifier Ei can be stored in the secure data storage system. The method then proceeds to **224**.

(25) At **224**, unique encrypted identifier Ei and second associated data Da**2** is transmitted to the data source system over the open network, and Ei, Da**1**, Da**2** and other suitable data is stored at the data source system, without the confidential data, so as to prevent unwanted access to the confidential data at the data source system over the open network. The method then proceeds to **230**.

(26) At **230**, it is determined whether additional data has been requested from the secure data network through the secure data network interface system using the unique encrypted identifier Ei. If it is determined that a predetermined period of time has elapsed since the unique encrypted identifier Ei has been received without a suitable function being implemented, then the method proceeds to **232** where the data is deleted. Otherwise, a suitable function is performed. For example, unique encrypted identifier Ei and other suitable data can be transmitted to the secure data network interface system for transmission over the secure data network, the confidential information can be translated to the unique identifier to transmit the additional data to the data source system over the open network. A settlement request can be transmitted with the unique identifier to the secure data network interface system, and a settlement confirmation and the unique identifier can be received from the secure data network interface system. Exception data and unique encrypted identifier can also be received from the secure data network interface system and exception response data can be transmitted to the secure data network interface system in response to the exception data. A transaction identifier, exception category data and the unique identifier can also be received from the secure data network interface system and biometric data can be transmitted to the secure data network interface system in response to the transaction identifier, the

exception category data and the unique identifier.

(27) Although exemplary embodiments of a system and method of the present invention have been described in detail herein, those skilled in the art will also recognize that various substitutions and modifications can be made to the systems and methods without departing from the scope and spirit of the appended claims.

Claims

1. An electronic data processing method, comprising: receiving a confidential electronic data record and an associated electronic data record at a first electronic data processing system; electronically transmitting the confidential electronic data record and the associated electronic data record from the first electronic data processing system to a second electronic data processing system.[.over an encrypted communications medium.].; generating an electronic unique encrypted identifier associated with the confidential electronic data record and the associated electronic data record using the second electronic data processing system; electronically transmitting the electronic unique encrypted identifier from the second electronic data processing system to the first electronic data processing system; and storing the electronic unique encrypted identifier with the associated electronic data record and with a time field in an electronic data memory device .Iadd.of the first electronic data processing system.Iaddend., wherein the time field is used to determine a storage period for the electronic unique encrypted identifier, wherein the storage period is determined as a function of response data.

2. The method of claim 1 wherein the storage period is determined as a function of an additional electronic data record that is received over .[.the.]. .Iadd.an .Iaddend.encrypted communications medium.

3. The method of claim 1 wherein the storage period is determined as a function .Iadd.of .Iaddend.an additional electronic data record that is received over .[.the.]. .Iadd.an .Iaddend.encrypted communications medium in response to a settlement request.

4. The method of claim 1 further comprising determining whether the storage period has elapsed and deleting the electronic unique encrypted identifier if the storage period has elapsed.

5. The method of claim 1 further comprising retrieving the electronic unique encrypted identifier from the electronic data memory device and transmitting the retrieved electronic unique encrypted identifier to the second electronic data processing system over .[.the.]. .Iadd.an .Iaddend.encrypted communications medium.

6. The method of claim 1 further comprising retrieving the electronic unique encrypted identifier from the electronic data memory device and transmitting the retrieved electronic unique encrypted identifier and an electronic request record to the second electronic data processing system over .[.the.]. .Iadd.an .Iaddend.encrypted communications medium.

7. The method of claim 6 further comprising: receiving the retrieved electronic unique encrypted identifier and the electronic request record at the second electronic data processing system; extracting the confidential electronic data record from .[.an.]. .Iadd.the .Iaddend.electronic data memory device; and processing the confidential electronic data record as a function of one or more instructions in the electronic request record.

8. The method of claim 7 further comprising: generating an electronic response data record associated with the electronic request record after processing the confidential electronic data record; storing the electronic response data record at the second electronic data processing system; retrieving the electronic unique encrypted identifier; and transmitting the electronic response data record and the electronic unique encrypted identifier to the first electronic data processing system.

9. The method of claim 1 further comprising retrieving the electronic unique encrypted identifier from the electronic data memory device and transmitting the retrieved electronic unique encrypted identifier and an electronic settlement request record to the second electronic data processing

system over .[.the.]. .Iadd.an .Iaddend.encrypted communications medium.

10. The method of claim 9 further comprising: receiving the retrieved electronic unique encrypted identifier and the electronic settlement request record at the second electronic data processing system; extracting the confidential electronic data record from .[.an.]. .Iadd.the .Iaddend.electronic data memory device; and performing settlement processing with a settlement system using the confidential electronic data record as a function of one or more instructions in the electronic settlement request record.

11. The method of claim 10 further comprising: generating an electronic settlement response data record associated with the electronic settlement request record after processing the confidential electronic data record; storing the electronic settlement response data record at the second electronic data processing system; retrieving the electronic unique encrypted identifier; and transmitting the electronic settlement response data record and the electronic unique encrypted identifier to the first electronic data processing system.

12. The method of claim 11 wherein the storage period is determined as a function of the electronic settlement response data record.

13. The method of claim 1 further comprising retrieving the electronic unique encrypted identifier from the electronic data memory device and transmitting the retrieved electronic unique encrypted identifier and an electronic reporting request record to the second electronic data processing system over .[.the.]. .Iadd.an .Iaddend.encrypted communications medium.

14. The method of claim 13 further comprising: receiving the retrieved electronic unique encrypted identifier and the electronic reporting request record at the second electronic data processing system; extracting the confidential electronic data record from .[.an.]. .Iadd.the .Iaddend.electronic data memory device; and performing report processing with a reporting system using the confidential electronic data record as a function of one or more instructions in the electronic .[.report.]. .Iadd.reporting .Iaddend.request record.

15. The method of claim 14 further comprising: generating an electronic reporting response data record associated with the electronic .Iadd.reporting .Iaddend.request record after processing the confidential electronic data record; storing the electronic reporting response data record at the second electronic data processing system; retrieving the electronic unique encrypted identifier; and transmitting the electronic reporting response data record and the electronic unique encrypted identifier to the first electronic data processing system.

16. The method of claim 15 wherein the storage period is determined as a function of the electronic reporting response data record.

17. An electronic data processing method, comprising: receiving a confidential electronic data record and an associated electronic data record at a first electronic data processing system; electronically transmitting the confidential electronic data record and the associated electronic data record from the first electronic data processing system to a second electronic data processing system .[.over and encrypted communications medium.].; generating an electronic unique encrypted identifier associated with the confidential electronic data record and the associated electronic data record using the second electronic data processing system; electronically transmitting the electronic unique encrypted identifier from the second electronic data processing system to the first electronic data processing system; and storing the electronic unique encrypted identifier with the associated electronic data record and with a time field in an electronic data memory device .Iadd.of the first electronic data processing system.Iaddend., wherein the time field is used to determine a storage period for the electronic unique encrypted identifier, wherein the storage period is determined as a function of an electronic settlement response data record.

18. An electronic data processing method, comprising: receiving a confidential electronic data record and an associated electronic data record at a first electronic data processing system; electronically transmitting the confidential electronic data record and the associated electronic data record from the first electronic data processing system to a second electronic data processing

system .[.over an encrypted communications medium.].; generating an electronic unique encrypted identifier associated with the confidential electronic data record and the associated electronic data record using the second electronic data processing system; electronically transmitting the electronic unique encrypted identifier from the second electronic data processing system to the first electronic data processing system; and storing the electronic unique encrypted identifier with the associated electronic data record and with a time field in an electronic data memory device .Iadd.of the first electronic data processing system.Iaddend., wherein the time field is used to determine a storage period for the electronic unique encrypted identifier, wherein the storage period is determined as a function of an electronic reporting response data record.