

Method and System for Processing a Transaction

Technical Field

[0001] The present disclosure generally relates to a method and system for processing a transaction.

Background Art

[0002] Electronic payment (i.e. non-cash payment) for transactions are increasingly adopted by users of all demographics due to its ease of use, speed and simplicity. Electronic payments are often mediated by payment networks that have pre-existing agreements with merchants. In a typical electronic transaction for goods and/or services, payment account information is presented by a consumer to a merchant (e.g. by a payment card being swiped/read at a payment terminal, or via wireless communication means between a consumer device and the payment terminal). The payment account information is then transmitted with a transaction request to an acquirer server, which in turn forwards the transaction request to a payment network server. The payment network server then routes the transaction request to an issuer server that can authorise the request. Authorisation of the transaction request then follows the route in reverse through the servers back to the merchant device. Once the authorisation is received by the merchant device, the merchant can complete the transaction with the consumer.

[0003] However, merchants who wish to offer electronic payment options to consumers often have to sign merchant agreements with respective payment networks (either directly with the payment networks or with the acquirer). Further, the merchants are generally required to pay interchange fees to the relevant payment network and the acquirer for each electronic transaction that originates from the merchant. In view of the various costs and requirements, as well as the implementation complexity, merchants (particularly small enterprises) may not offer a full spectrum of electronic payment options currently available to a consumer. While larger merchants can offer a broader range of electronic payment options, additional operating expenses can be incurred as electronic payment options are often mutually incompatible, requiring multiple payment terminals at the premises of the merchant. Merchants can also incur significant costs in the setup, operation and maintenance of these payment terminals.

[0004] Additionally, the payment terminals can be susceptible to security breaches, and security hackers can take advantage of vulnerabilities in these devices to steal payment card information of the consumer. The stolen payment card information may be misused in payment card fraud. For example, vulnerabilities in point-of-sale (POS) systems can be exploited by malware which can intercept payment card information or transmit unencrypted card information to fraudsters who can then use the payment card information to make fraudulent transactions. Victims of such frauds are often unaware of such activities until a billing statement is issued to them.

Summary

[0005] In an embodiment, there is provided a method for processing a transaction. The method includes the following steps: (a) receiving, from a server associated with a merchant, a transaction request including a user account identifier and a transaction amount, (b) verifying, if the user account identifier belongs to a pre-registered user account of an associated payment network, (c) upon a successful verification of the user account identifier, recording the transaction amount on an account belonging to the associated payment network, and (d) transmitting, to a server associated with the payment network, a transaction authorisation message including the user account identifier and the transaction amount to be recorded on the user account.

[0006] In another embodiment, there is provided a system for processing a transaction. The system includes a receiver configured to receive, from a server associated with a merchant, a transaction request including a user account identifier and a transaction amount, and a processor configured to verify if the user account identifier belongs to a pre-registered user account of an associated payment network and, upon a successful verification of the user account identifier, record the transaction amount on an account belonging to the associated payment network. The system also includes a transmitter configured to transmit, upon the successful verification of the user account identifier, a transaction authorisation message to a server associated with the payment network. The transaction authorisation message includes the user account identifier and the transaction amount to be recorded on the user account.

[0007] In another embodiment, there is provided a system for processing a transaction. The system includes at least one processor, and at least one memory including computer program code. The at least one memory and the computer program code are configured to, with the at least one processor, cause the system at least to (a) receive, from a server associated with a merchant, a transaction request including a user account identifier and a

transaction amount, (b) verify, if the user account identifier belongs to a pre-registered user account of an associated payment network, (c) upon a successful verification of the user account identifier, record the transaction amount on an account belonging to the associated payment network, and (d) transmit, to a server associated with the payment network, a transaction authorisation message including the user account identifier and the transaction amount to be recorded on the user account.

[0008] Details of one or more embodiments of the subject matter of this specification are set forth in the accompanying drawings and the description below. Other desirable features and characteristics will become apparent from the subsequent description and the appended claims, taken in conjunction with the accompanying drawings and the background of the disclosure.

Brief Description of Drawings

[0009] Embodiments will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

Fig.1

[0010] Fig. 1 shows a schematic diagram of a system configured to process a transaction, in accordance with embodiments of the disclosure.

Fig.2

[0011] Fig. 2 shows a flowchart illustrating a method for processing a transaction, in accordance with embodiments of the disclosure.

Fig.3

[0012] Fig. 3 shows a schematic diagram illustrating the exchange of information in a method for processing a transaction, in accordance with an embodiment of the disclosure.

Fig.4

[0013] Fig. 4 shows a schematic diagram illustrating the exchange of information in a method for processing a transaction, in accordance with another embodiment of the disclosure.

Fig.5

[0014] Fig. 5 shows a schematic diagram illustrating the exchange of information in a method for registering a user account, in accordance with embodiments of the disclosure.

Fig.6

[0015] Fig. 6 shows a schematic diagram of a computing device used to realise the system of Fig. 1.

[0016] Skilled artisans will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been depicted to scale. For example, the dimensions of some of the elements in the illustrations, block diagrams or flowcharts may be exaggerated in respect to other elements to help to improve understanding of the present embodiments.

Description of Embodiments

[0017] Embodiments of the present disclosure provide a method and a system for processing a transaction. In embodiments, the transaction processing system can receive a transaction request including a user account identifier from a merchant who may not have a pre-existing merchant agreement with a payment network. The transaction processing system can process the transaction request and transmit a transaction authorisation message that complies with communication protocol of the payment network to a server associated with the network, to debit/credit a user account that is associated with the user account identifier. Thus, the transaction processing system according to embodiments can allow the merchants without pre-existing merchant agreements to offer a wider range of electronic payment options to the users while minimising conventional interchange fees and/or associated operating expenses. In embodiments, the transaction processing system can address compatibility issues associated with differences in communication protocols of operators (e.g. with merchants and payment networks) and can facilitate intra-border and/or cross-border transactions. For example, the transaction processing system can facilitate communication between one or more financial service providers of mobile wallet applications with merchants (local and/or overseas) that may not have existing agreement with the network associated with the payment account, and provide users access to funds in the mobile wallet accounts for transactions with such merchants.

[0018] Embodiments of the present disclosure also provide an alternate user identification which can allow users to perform transactions with a user account identifier. In embodiments, the user account identifier can be associated with a payment account of a user (also known as a user account), registered by the user with an entity party to the payment network (e.g. a payment services provider or an issuer of the user account) and presented in lieu of the user account details for a transaction. That is, the user account identifier can be used as a reference that maps back to one or more account information of the user account. The user account identifier, in embodiments, can be used as a substitute for user account information that may be sensitive in at least a part of the transaction process, thereby minimising exposure of the user account information, enhancing user privacy and lowering risk of compromise and/or unauthorised access to the user account information. As will be described in more detail, the user account identifier can be appropriately used as an identification for access to transaction services. These transaction services can include, but is not limited to online transactions (e.g. online banking and e-commerce, such as tax refund services) and in-person transactions (e.g. transactions at retail locations, at payment terminals such as automated teller machines (ATMs) and retail banking). The user account identifier can be a machine-readable optical code (e.g. barcode or QR code).

[0019] In embodiments of the present disclosure, the user can first request that a user account identifier be associated with at least the user account information. The user can additionally request that the user account identifier be associated with user information (e.g. passport information) that is not present in the user account information. Registration can be performed via an application program that is installed on a user device (e.g. an e-wallet application), through an online portal (e.g. an HTML website) associated with the entity party to the interchange network, or at payment terminals (e.g. ATMs associated with an issuer of the payment account). That is, a registration request can be submitted by the user through the application program, online portal or payment terminal, and the registration request can include user account information and, in some embodiments, user information as well. The entity to which the registration request is sent can be a payment network (e.g. a mobile wallet service provider) with a server configured to receive the registration request. In embodiments, the payment network can be an entity (e.g. a company or organisation) which operates to process transactions, clear and settle funds for payments between two other entities, or an entity that issues (e.g. establishes, manages, administers) a user account (e.g. an electronic wallet, a credit card account, a stored value card, or a debit card account linked to a bank account).

[0020] In some embodiments, the server associated with the payment network, also known as a payment network server, can be configured to (i) generate the user account identifier, (ii) associate the user account identifier with the user account information and user information, and (iii) transmit a copy of a mapping file comprising the user account identifier, user account information and user information to an interchange server that is configured to link merchants with various payment networks. In alternative embodiments, the payment network server does not generate the user account identifier, but is rather, configured to route the registration request to the interchange server. The interchange server in turn handles the association of the user account identifier with the user account information and the user information, and transmit a confirmation message indicative of successful account association to the user device. The interchange server can store a copy of a mapping file comprising the user account identifier, user account information and user information in a database linked to the interchange server.

[0021] In embodiments of the disclosure, the user account identifier can be presented in lieu of payment account information to a merchant device (e.g. in lieu of a payment card at a transaction terminal or in lieu of a user identifier at an online portal or application program) to initiate a transaction. That is, the user account identifier can be used as an identification method for user access to transaction services once the user account identifier is associated with the user account information. For example, the user account identifier can be in the form of a machine-readable code (e.g. QR code), and a transaction can be initiated by presenting the user account identifier that is associated with a user account (e.g. a mobile wallet account) to the merchant.

[0022] In embodiments, a transaction request can be generated by a server associated with the merchant responsive to receipt of the user account identifier. The transaction request can be forwarded by the server to the transaction processing system. The merchant may not have an existing merchant agreement with the payment network (e.g. service provider of the mobile wallet). In embodiments, the transaction request may be based on a communication between the merchant device and the server associated with the merchant, the communication being in accordance with a first communication protocol. The transaction request may not be compatible with communication protocols of the payment network, which can communicate with a user device in accordance with a second communication protocol. The transaction processing system can process the transaction request and transmit a transaction authorisation message to the associated mobile wallet service provider. In some embodiments, the transaction authorisation message can be generated by the transaction processing system based on information from at least the transaction request. In other

embodiments, the transaction authorisation message can be the transaction request modified by the transaction processing system for compatibility with the payment network. In embodiments, the transaction request can be formatted in accordance with the first communication protocol, and the transaction authorisation message can be formatted in accordance with the second communication protocol. In various embodiments, the transaction authorisation message can include the user account identifier and the transaction amount to be recorded on the user account and is compatible with the communication protocols of the payment network. Accordingly, in embodiments, funds can be debited/credited to the user account (e.g. a mobile wallet) in the transaction with the merchant, even though the transaction request may not be compatible with communication protocols of the payment network.

[0023] The transaction processing system in accordance with embodiments of the present disclosure include a server configured to route transaction requests from merchants to the relevant payment network(s). Particularly, the system is configured to (i) receive from a server associated with the merchant, a transaction request comprising the user account identifier and a transaction amount. The system then (ii) verifies if the user account identifier belongs to a pre-registered user account of a payment network that is party to the transaction processing system (i.e. an associated payment network), and upon a successful verification of the user account identifier, the system (iii) transmits, to a server associated with the payment network, a transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account. Additionally, the system (iv) records on an account belonging to the associated payment network, the transaction amount. Thus, the transaction processing system in embodiments can act as an intermediary between the merchants and the payment network and can facilitate transactions comprising a user account identifier from merchants who may not have pre-existing merchant agreements with relevant payment networks.

[0024] In embodiments, the payment account refers to one that is suitable for a transaction. The payment account can be used for the purpose of purchasing goods and/or services. The payment account can be a mobile wallet (e-wallet) account, a deposit account, a credit card account, a current account, or any other type of account offered by a financial institution (e.g. a payment service provider) and represents the funds that an account holder has entrusted to the financial institution and from which the account holder can make transactions. Alternatively, a payment account can be a loan account in which case the account holder owes money to the financial institution. Moreover, the payment account may be a payment card. A mobile wallet refers to an account that can be used by a mobile wallet

user for a transaction with a merchant. The mobile wallet is usually linked to a mobile wallet user's bank account or a mobile wallet user's payment card. Payments from mobile wallets can be facilitated by a different entity (e.g. a third party payment network). Additionally, or alternatively, the payments by mobile wallets are facilitated by an entity who also manages the payment cards. Such transactions that are made using the mobile wallets are also known as wallet-based transactions.

[0025] In embodiments, the payment network includes a payment service provider (e.g. electronic payment service provider, issuer or an automated clearinghouse). The payment network server is generally associated with the payment service provider (the entity to whom an account holder has entrusted funds to). The payment network may be an entity (e.g. a company or organisation) which issues (e.g. establishes, manages, administers) a payment account (e.g. a mobile wallet, credit card account, a stored value card, or a debit card account linked to a bank account) and payment account information. The payment network server may include one or more computing devices that are used to establish communication with another server (e.g. an interchange server as disclosed) by exchanging messages with and/or passing information to the other server. Further, in embodiments, the payment network server can also establish communication with the other server to complete a process or step that may be external to the transaction process. For example, the interchange server may be associated with a payment transaction processing service, and the payment network server can be configured to communicate with the server to register a user to the service, or to verify the user to the service. In embodiments of the disclosure, the payment network can be an electronic payment platform managed by a mobile wallet server provider.

[0026] In embodiments, the interchange server is used to process financial transactions, and can include institutions, instruments, rules, procedures, standards, and technologies that make such processing possible. The interchange server may be managed by a payment processing entity which is an intermediary that can link the different parties involved in a financial transaction. For example, when a user uses the user account identifier to initiate a transaction request, in accordance with embodiments of the disclosure, the interchange server may process the transaction request from the merchant, verify if the user account identifier belongs to a pre-registered user account of an associated payment network, and responsive to a successful verification, transmit a transaction authorisation message to the relevant payment network. The interchange server may also record the transaction amount on an account belonging to the relevant payment network. In embodiments, the transaction authorisation message includes the user account identifier and the transaction amount to be

recorded on the user account, and is compatible with communication protocols of the relevant payment network. The interchange server can additionally generate and transmit a transaction confirmation message to the merchant. A further example of the payment network server is one that can manage rules for accounts that may be issued by payment networks and can facilitate funds exchange between accounts. Therefore, the interchange server may facilitate communication between the payment network associated to an account of the user and the merchant for the transfer of funds between the payment network and the merchant. The interchange server (or payment processing entity) may also generate programming codes and instructions relating to the transaction. Further, in embodiments, the interchange server can be configured to process information to register, verify and/or authenticate the user. In an embodiment, the interchange server can facilitate transactions between merchants (local and/or overseas) and users of mobile wallet applications associated with one more or financial service providers, and provide users access to funds in the mobile wallet applications for transactions with the merchants (e.g. a user may request that funds be debited/credited to a local wallet in a transaction with a merchant that may not have a pre-existing agreement with the financial provider of the mobile wallet).

[0027] In embodiments, the transaction generally includes a financial transaction and can effect a change in the balance of financial accounts of two or more parties. A financial transaction can also include an agreement, or communication, carried out between a buyer (e.g. a user or account holder) and a seller (e.g. a merchant) to exchange goods and/or services for payment. Thus, a transaction request includes information that is exchanged or provided to facilitate the transaction. A transaction request, in accordance with embodiments of the disclosure, can include the user account identifier that is associated with account information of the user (e.g. user's mobile wallet details). The user account information can include an identifier of the payment network identifying the entity managing the user's payment account. The transaction request can also include a transaction amount (i.e. the value of the goods and/or services), a description of the goods and/or services and details of the merchant involved in the transaction. The transaction request can also include information relating to the merchant, e.g. a merchant's account identifying the entity managing the merchant's account. The transaction can also include an electronic funds transfer (i.e. the electronic transfer of money from one financial account to another, either within a single financial institution or across multiple institutions via computer-based systems).

[0028] The term "configured to" is used in the specification in connection with systems, apparatus, and computer program components. For a system of one or more computers to

be configured to perform particular operations or actions means that the system has installed on it software, firmware, hardware, or a combination of them that in operation cause the system to perform the operations or actions. For one or more computer programs to be configured to perform particular operations or actions means that the one or more programs include instructions that, when executed by data processing apparatus, cause the apparatus to perform the operations or actions. For special-purpose logic circuitry to be configured to perform particular operations or actions means that the circuitry has electronic logic that performs the operations or actions.

[0029] Embodiments of the present disclosure will be described, by way of example only, with reference to the drawings. Like reference numerals and characters in the drawings refer to like elements or equivalents.

[0030] Some portions of the description which follows are explicitly or implicitly presented in terms of algorithms and functional or symbolic representations of operations on data within a computer memory. These algorithmic descriptions and functional or symbolic representations are the means used by those skilled in the data processing arts to convey most effectively the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities, such as electrical, magnetic or optical signals capable of being stored, transferred, combined, compared, and otherwise manipulated.

[0031] Unless specifically stated otherwise, and as apparent from the following, it will be appreciated that throughout the present specification, discussions utilizing terms such as “associating”, “calculating”, “comparing”, “determining”, “forwarding”, “generating”, “identifying”, “including”, “inserting”, “modifying”, “receiving”, “recording”, “replacing”, “scanning”, “transmitting”, “updating” or the like, refer to the action and processes of a computer system, or similar electronic device, that manipulates and transforms data represented as physical quantities within the computer system into other data similarly represented as physical quantities within the computer system or other information storage, transmission or display devices.

[0032] The present specification also discloses apparatus for performing the operations of the methods. Such apparatus may be specially constructed for the required purposes or may include a computer or other computing device selectively activated or reconfigured by a computer program stored therein. The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various machines may be

used with programs in accordance with the teachings herein. Alternatively, the construction of more specialized apparatus to perform the required method steps may be appropriate. The structure of a computer will appear from the description below.

[0033] In addition, the present specification also implicitly discloses a computer program, in that it would be apparent to the person skilled in the art that the individual steps of the method described herein may be put into effect by computer code. The computer program is not intended to be limited to any particular programming language and implementation thereof. It will be appreciated that a variety of programming languages and coding thereof may be used to implement the teachings of the disclosure contained herein. Moreover, the computer program is not intended to be limited to any particular control flow. There are many other variants of the computer program, which can use different control flows without departing from the spirit or scope of the disclosure.

[0034] Furthermore, one or more of the steps of the computer program may be performed in parallel rather than sequentially. Such a computer program may be stored on any computer readable medium. The computer readable medium may include storage devices such as magnetic or optical disks, memory chips, or other storage devices suitable for interfacing with a computer. The computer readable medium may also include a hard-wired medium such as exemplified in the Internet system, or wireless medium such as exemplified in the GSM mobile telephone system. The computer program when loaded and executed on a computer effectively results in an apparatus that implements the steps of the preferred method.

[0035] In embodiments of the present disclosure, use of the term 'server' may mean a single computing device or at least a computer network of interconnected computing devices which operate together to perform a particular function. In other words, the server may be contained within a single hardware unit or be distributed among several or many different hardware units.

[0036] Fig. 1 shows a schematic diagram of a system 100 configured to implement the method 200 of Fig. 2. The system 100 includes a user device 102, a merchant device 118, a merchant server 104, an interchange server 106 and a payment network server 108. In Fig. 1, the interchange server 106 is shown to include processor 110, memory 112, receiver 114 and transmitter 116. While it is not shown in Fig. 1, it can be appreciated that the user device 102, the merchant device 118, the merchant server 104 and the payment network server 108 can include similar devices (i.e. processor, memory, receiver and transmitter). In embodiments, the user device 102 is in direct communication with the payment network

server 108 in accordance with a first communication protocol. The merchant device 118 is in direct communication with the merchant server 104 in accordance with a second communication protocol. The merchant server 104 is in direct communication with the interchange server 106. The payment network server 108 is also in direct communication with the interchange server 106.

[0037] The merchant device 118 (also known as a transaction terminal) includes a device that can interface with user devices and/or payment cards to facilitate a transaction. The merchant device 118 may be a device located at the merchant's store, a portable computing device or a payment gateway in the merchant's website. Examples of such a terminal include but not limited to a point-of sale (POS) terminal, an automated teller machine, a mobile phone, a laptop or a tablet. In embodiments, the merchant device 118 is configured to communicate with the server 104 associated with the merchant.

[0038] In embodiments, as will be described in more details with reference to Figs. 2-4, the receiver 114 is configured to receive from a server associated with a merchant (e.g. the merchant server 104), a transaction request comprising a user account identifier and a transaction amount. The processor 110 is configured to verify if the user account identifier belongs to a pre-registered user account of an associated payment network. Upon a successful verification of the user account identifier, the processor is configured to record the transaction amount on an account belonging to the associated payment network. The transmitter 116 is configured to transmit, upon the successful verification of the user account identifier, a transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account to a server associated with the payment network (e.g. payment network server 108). The processor 110 can also be further configured to generate a message indicative of successful processing of the transaction request in response to recording of the transaction amount on the account belonging to the associated payment network. The transmitter 116 can be further configured to transmit the message to the server 104 associated with the merchant.

[0039] In embodiments, as will be described in more details with reference to Fig. 5, the receiver 114 can be further configured to receive, from the server 108 associated with the payment network, a user account association request comprising user information and user account information. The processor 110 can be configured to generate the user account identifier based on at least the user information and the user account information, and associate the user information and the user account information with the user account identifier. The transmitter 116 can be further configured to transmit a confirmation message

indicative of successful account association. The confirmation message includes at least the user account identifier.

[0040] Fig. 2 shows a flowchart illustrating a method 200 for processing a transaction, in accordance with embodiments of the disclosure. The method 200 can be implemented by the interchange server 106 of system 100. The method 200 broadly includes step 202 of receiving, from a server associated with a merchant, a transaction request comprising a user account identifier and a transaction amount, step 204 of verifying, if the user account identifier belongs to a pre-registered user account of an associated payment network, wherein upon a successful verification of the user account identifier, step 206 of recording the transaction amount on an account belonging to the associated payment network, and step 208 of transmitting, to a server associated with the payment network, a transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account.

[0041] The method 200 is described in detail with reference to Fig. 3. Fig 3 shows a schematic diagram illustrating the exchange of information in a method 300 for processing a transaction, in accordance with an embodiment of the disclosure. The exchange of information in the transaction processing method 300 occurs between the user device 102, the merchant server 104, the interchange server 106 and the payment network server 108.

[0042] With reference to Fig. 3, a transaction request 320 is generated by the merchant server 104 responsive to (i) receipt of a user request 310 transmitted from the user device 102 to the merchant server 104 and (ii) receipt of a message 312 including the user account identifier, responsive to merchant request 314 for a user account identifier. In embodiments, communication of the user request 310 and the message 312 between the user device 102 and the merchant server 104 can be facilitated by merchant device 118. The transaction request 320 can include a user account identifier and a transaction amount. The user request 310 can include a user request to initiate the transaction and can be generated by the user device 102 to initiate an online transaction (e.g. online banking and e-commerce, such as tax refund services) or an in-person transaction (e.g. transactions at retail locations, at payment terminals such as automated teller machines (ATMs) and retail banking). The message 312 can include the user account identifier and can be transmitted by the user device 102 to the merchant server 104.

[0043] The interchange server 106 receives the transaction request 320 from the merchant server 104 (step 202 of Fig. 2). The interchange server 106 can verify, if the user account identifier belongs to a pre-registered user account of an associated payment network (step

204 of Fig. 2). In embodiments of the disclosure, the interchange server 106 can optionally record the verification result in recordal 322. The interchange server can also generate and transmit a message 324 indicative of the result of the verification to the merchant server 104. In an embodiment, the interchange server 106 can verify the user account identifier by determining if the user account identifier exists on a mapping file stored in a database linked to the interchange server 106. The mapping file can include the user account identifier, associated user account information and user information.

[0044] Upon the successful verification of the user account identifier, the interchange server 106 can transmit a transaction authorisation message 340 to the payment network server 108. The transaction authorisation message 340 is compatible with communication protocols of the payment network server 108 and can include the user account identifier and the transaction amount to be recorded on the user account (step 206 of Fig. 2). In embodiments, the interchange server 106 can identify the relevant payment network 108 to which the transaction authorisation message 340 is sent based on the user account information, retrieved from the mapping file stored in the database linked to the interchange server 106. In various embodiments, the interchange server 106 can manage an account belonging to the payment network, and can record the transaction amount on the account belonging to the payment network in recordal 322. The interchange server 106 can additionally generate, in response to the recordal 322 of the transaction amount on the account belonging to the payment network, a message 334 indicative of successful processing of the transaction request, and transmit the message 334 to the merchant server 104.

[0045] In some embodiments, the transaction authorisation message 340 can be generated by the interchange server 106 based on information from at least the transaction request 320 and the user account information retrieved from the database. In other embodiments, the transaction authorisation message 340 can be a modified transaction request, being modified by the interchange server 106 for compatibility with communication protocols of the payment network 108 and to include at least the transaction amount to be recorded on the user account. That is, in embodiments, the interchange server 106 can be configured to communicate with the merchant server 104 in a one communication protocol and with the payment network server 108 in another communication protocol. Thus, the interchange server 106 according to embodiments can address potential communication protocol incompatibility issues between the merchant server 104 and the payment network server 108.

[0046] The payment network server 108 is configured to receive the transaction authorisation message 340, and can further process the transaction authorisation message 340. For example, in an embodiment, the payment network server 108 can manage an account belonging to the user, and can record the transaction amount on the user account in recordal 342. The payment network server 108 can also generate a message 344 indicative of successful recordal 342 of the user account and transmit the message 344 to the user device 102.

[0047] In embodiments of the disclosure, the transaction request 320 can further include a merchant identifier. Upon the successful verification of the user account identifier, the interchange server 106 can be further configured to determine, based on the merchant identifier, a merchant account associated with the merchant identifier. The payment network server 108 can manage an account belonging to the merchant, and can record the transaction amount on the merchant account. The interchange server 106 can generate the merchant account recordal message (not shown) indicative of successful recordal and transmit the merchant account recordal message (not shown) to the merchant server 104.

[0048] An embodiment of the method 300 is described using a sale tax refund transaction as a practical example. For instance, if the user wishes to initiate a sale tax refund transaction, the user can start an application program that is installed on the user device 102 (e.g. an e-wallet application) or initiate a request at the merchant device 104 (e.g. a payment terminal at a tax refund counter). The user device transmits the user request 310 to the merchant server 104 (which can be associated with a tax refund operator). The merchant request 314 for the user account identifier is then transmitted by the merchant server 104 to the user device 102. The user device can, responsive to receipt of the merchant request 314, transmit the message 312 include the user account identifier and user information to the merchant server 104. For example, the user account identifier can include a machine-readable optical code (e.g. a barcode or a QR code), and can scanned by the merchant device (e.g. a payment terminal at a tax refund counter) when presented by the user to initiate a tax refund transaction request. The merchant server 104 may additionally request for user passport information, verify the passport information and then generate the tax refund transaction request (an example of transaction request 320), the request including a user account identifier and a transaction amount, and transmits the request to interchange server 106 (e.g. a server associated with a third-party mobile and online payment platform). The tax refund transaction request may be generated according to a communication protocol compatible with the merchant server 104. The interchange server 106 can verify, if the user account identifier belongs to a mobile wallet (a pre-registered user account) managed by an

associated payment network. Upon successful verification, the interchange server 106 can record the transaction amount by crediting the transaction amount on the account belonging to the payment network in the recordal 332. The interchange server 106 can also transmit the transaction authorisation message 340 to a server associated with payment network, the authorisation message 340 comprising the user account identifier and the tax refund to be credited to the user mobile wallet account. The transaction authorisation message 340 may be transmitted according to another communication protocol compatible with the server associated with payment network.

[0049] In embodiments of the disclosure, the user account identifier can comprise a machine-readable code (e.g. a barcode or a QR code). For example, the code can include a header and a payload. The header can include a fixed 2 byte entry (e.g. 28). The header can also include a single digit protocol version (e.g. 1) indicative of the version of Contactless Gateway Code Protocol (GCGP) and a 3-digit country code (e.g. 006 for Korea). The header can also include a 2 digit business type code (e.g. 02 for in-store payment, merchant-scan mode). The payload can include user information such as date of birth in a 6 digit format (e.g. 830112 for 12 January 1983) and a 6 digit PIN (e.g. 123456). The payload can also include 4 digit expiry date of the user account identifier (e.g. 2208 for Aug, 2022). Hence the code (i.e. the user account identifier) can be expressed as 28 1 006 02 830112 123456 2208.

[0050] Fig 4 shows a schematic diagram illustrating the exchange of information in another method 400 for processing a transaction, in accordance with embodiments of the disclosure. The method 400 is broadly similar to that of method 300, with the exception that transaction request 430 is transmitted by the merchant server 104 only after successful verification of the user account identifier.

[0051] The exchange of information between the user device 102 and the merchant server 104 in the method 400 is similar to that of the method 300. The user device 102 can transmit user request 410 to initiate a transaction, and can also transmit a message 412 including a user account identifier to the merchant server 104, responsive to the merchant request 414 for a user account identifier. Communication of the user request 410 and the message 412 between the user device 102 and the merchant server 104 can be facilitated by merchant device 118. In an embodiment, the user account identifier can include a machine-readable optical code (e.g. a barcode or a QR code), and is scanned by the user device (e.g. a payment terminal at a tax refund counter) when presented by the user to initiate a tax refund transaction request. The merchant server 104 may additionally request for user information

(e.g. passport information) and may verify the user information before transmitting a transaction request 430 to the interchange server 106.

[0052] In contrast to method 300, the merchant server 104 in method 400 is first configured to transmit a user account identifier verification request 420 to the interchange server 106. The user account identifier verification request 420 includes the user account identifier. The interchange server 106 can receive the verification request 420, verify if the user account identifier belongs to a pre-registered user account of an associated payment network, and record a result indicative of the verification in a recordal 422. The interchange server 106 can subsequently generate and transmit a message 424, including the result of the verification to the merchant server 104. If the message 424 includes a result indicative of a successful verification of the user account identifier, the merchant server 104 transmits a transaction request 430 to the interchange server 106, the transaction request 430 including the user account identifier and a transaction amount. In embodiments, the transaction request 430 can further include, but is not limited to, additional information provided by the user (e.g. passport information), merchant identifier, transaction reference number.

[0053] The interchange server 106 receives the transaction request 430 and in turn transmits, to the payment network server 108, a transaction authorisation message 440 comprising the user account identifier and the transaction amount to be recorded on the user account. The exchange of information between the interchange server 106 and the payment network server 108 in the method 400 is similar to that of the method 300. In various embodiments, the interchange server 106 can manage an account belonging to the payment network, and can record the transaction amount on the account belonging to the payment network in recordal 432. In embodiments, the recordal 432 of the transaction amount can include an increase in authorisation amount of the payment account.

[0054] In some embodiments, the transaction authorisation message 440 can be generated by the interchange server 106 based on information from at least the transaction request 430 and the user account information retrieved from the database. In other embodiments, the transaction authorisation message 440 can be a modified transaction request, being modified by the interchange server 106 for compatibility with communication protocols of the payment network 108 and to include at least the transaction amount to be recorded on the user account. That is, in some embodiments, the interchange server 106 can be configured to communicate with the merchant server 104 in one communication protocol and with the payment network server 108 in another communication protocol.

[0055] In embodiments, the payment network server 108 can manage an account belonging to the merchant, and can also record the transaction amount on the merchant account, responsive to recordal 432 of the transaction amount on the account belonging to the payment network. The interchange server 106 can generate a merchant account recordal message 434 indicative of successful recordal on the merchant account, and transmit the merchant account recordal message 434 to the merchant server 104. In embodiments, the recordal 432 of the transaction amount and the transmission of the message 434 to the merchant server can be asynchronous with the transmission of transaction authorisation message 440 to payment network server 108. That is, the interchange server can first record, the transaction amount on accounts belonging to the payment network and the merchant, or first transmit the transaction authorisation message 440 to the payment. It can also be appreciated that the records of the transaction amount and the transmission of the transaction authorisation message may occur at the same time.

[0056] The payment network server 108 is configured to receive the transaction authorisation message 440, and can further process the transaction authorisation message 440. For example, in an embodiment, the payment network server 108 can record the transaction amount as entry 442 on the user account, generate a message 444 responsive to the recordal 442 and transmit the message 444 to the user device 102.

[0057] The system 100 can also be used to pre-register a user account. Fig. 5 shows a schematic diagram illustrating the flow of information in a method 500 for registering a user account, in accordance with embodiments of the disclosure. The method 500 broadly includes step (i) of receiving, from the server 108 associated with the payment network, a user account association request 510 comprising the user information and the user account information, step (ii) of generating the user account identifier based on at least the user information and the user account information, step (iii) of associating the user information and the user account information with the user account identifier, and step (iv) of transmitting, to the server 108 associated with the payment network, a confirmation message 516 indicative of successful account association, the confirmation message 516 comprising at least the user account identifier.

[0058] In embodiments, the user account association request 510 can be transmitted by the user device 102 to the payment network server 108. The request 510 may be initiated by a user starting an application program that is installed on the user device 102 (e.g. an e-wallet application or a payment terminal associated with the payment network). The payment network server 108 can be configured to record the user account association request 510 in

a recordal 512 and forward the user account association request 510 to the interchange server 106. The user account association request 510 can include the user information and the user account information. For example, the user information can include a birth date of the user and user passport information. The user information can also include verification code e.g. PIN that the user can use, if necessary to authenticate user account information in a transaction request. The user account association request 510 can also include a payment limit, a validity period (and/or expiry date) of the user account identifier. The payment limit, the validity period and/or expiry date of the user account identifier can be determined by the user.

[0059] The interchange server 106 is configured to receive the user account association request 510 from the payment network server 108 and can generate the user account identifier based on at least the user information and the user account information. The interchange server 106 can associate the user information and the user account information with the generated user account identifier, and record the association and user account identifier in a recordal 514. The interchange server 106 can further transmit a confirmation message 516 indicative of successful account association to the payment network server 108. The confirmation message 516 comprises at least the user account identifier. The payment network server 108 is configured to route the confirmation message 516 to the user device 102.

[0060] In an alternative embodiment, instead of the interchange server 106, the user account identifier can be generated by the payment network server 108, and the payment network server 108 can associate the user information and the user account information with the user account identifier. That is, in the alternate embodiment, the generation and association of the user account identifier is executed by the payment network server 108 rather than the interchange server 106. In the alternate embodiment, the payment network server 108 can forward a mapping file comprising the user account identifier, the user information and the user account information to the interchange server 106. The interchange server 106 can receive and process the mapping file (e.g. by recording the association of the user account identifier, the user information and the user account information). The interchange server 106 then forwards an authorisation message indicative of successful recordal to the payment network server 108. The payment network server can forward a confirmation message indicative of successful account association to the user device 102, the confirmation message comprising at least the user account identifier.

[0061] An embodiment of the method 500 is now described. For instance, if the user wishes to pre-register a user account (e.g. a mobile wallet account), the user can start the relevant application program that is installed on the user device 102 (e.g. an e-wallet application). User information such as birth date and password information can be either retrieved or entered, and can be transmitted to the payment network server 108 (e.g. a server associated with mobile wallet) in the user account association request 510. The user account association request 510 can also include verification code e.g. PIN that the user can use, and the validity period of the user account identifier. The payment network server 108 can receive the user account association request 510 and forward the request 510 to the interchange server 106 (e.g. a server associated with a third-party mobile and online payment platform) which can process the request 510. For example, the interchange server 106 can generate the user account identifier in a machine-readable code (e.g. a barcode or a QR code) based on at least the user information and the user account information, and associate the user account identifier with the user information and the user account information in the recordal 514. The interchange server 516 can transmit the confirmation message 516 including the user account identifier to the payment network server 108. The payment network server 108 records the message 516 and routes the message 516 to user device 102. The user device 102 can store the user account identifier for use in transactions with merchants.

[0062] Various embodiments of the disclosure can facilitate transactions between parties with different communication protocols, in contrast to conventional transaction processing methods which require parties to the transaction processing network to adhere to a common communication protocol. In other words, embodiments can address potential compatibility issues associated with differences in communication protocols of participants of the network (e.g. differences in communication protocols of merchants and payment networks) and can facilitate intra-border and/or cross-border transactions. In an embodiment, the transaction processing system can allow users access to their local payment accounts in transactions with merchants (local and/or overseas) that do not adhere to communication protocols set by the network managing the payment account. For example, the transaction processing system can facilitate transactions between one or more financial service providers of mobile wallet applications and merchants (local and/or overseas), and provide users access to funds in the mobile wallet accounts for transactions with the merchants, thereby improving user experience. Embodiments also can provide a simplified and streamlined transaction processing system and method. Instead of using multiple systems to record a transaction and subsequently, process transactions for a user, it is possible to use a single system

according to embodiments to perform this function. The system according to embodiments can capture data effectively, thereby reducing processing time among multiple systems.

[0063] Fig. 6 depicts an exemplary computing device 600, hereinafter interchangeably referred to as a computer system 600, where one or more such computing devices 600 may be used to execute the method 300 of Fig. 3. One or more components of the exemplary computing device 600 can also be used to implement the system 100 as well as the user device 102, the merchant server 104, the interchange server 106 and the payment network server 108. The following description of the computing device 600 is provided by way of example only and is not intended to be limiting.

[0064] As shown in Fig. 6, the example computing device 600 includes a processor 607 for executing software routines. Although a single processor is shown for the sake of clarity, the computing device 600 may also include a multi-processor system. The processor 607 is connected to a communication infrastructure 606 for communication with other components of the computing device 600. The communication infrastructure 606 may include, for example, a communications bus, cross-bar, or network.

[0065] The computing device 600 further includes a main memory 608, such as a random access memory (RAM), and a secondary memory 610. The secondary memory 610 may include, for example, a storage drive 612, which may be a hard disk drive, a solid state drive or a hybrid drive and/or a removable storage drive 617, which may include a magnetic tape drive, an optical disk drive, a solid state storage drive (such as a USB flash drive, a flash memory device, a solid state drive or a memory card), or the like. The removable storage drive 617 reads from and/or writes to a removable storage medium 677 in a well-known manner. The removable storage medium 677 may include magnetic tape, optical disk, non-volatile memory storage medium, or the like, which is read by and written to by removable storage drive 617. As will be appreciated by persons skilled in the relevant art(s), the removable storage medium 677 includes a computer readable storage medium having stored therein computer executable program code instructions and/or data.

[0066] In an alternative implementation, the secondary memory 610 may additionally or alternatively include other similar means for allowing computer programs or other instructions to be loaded into the computing device 600. Such means can include, for example, a removable storage unit 622 and an interface 650. Examples of a removable storage unit 622 and interface 650 include a program cartridge and cartridge interface (such as that found in video game console devices), a removable memory chip (such as an EPROM or PROM) and associated socket, a removable solid state storage drive (such as a

USB flash drive, a flash memory device, a solid state drive or a memory card), and other removable storage units 622 and interfaces 650 which allow software and data to be transferred from the removable storage unit 622 to the computer system 600.

[0067] The computing device 600 also includes at least one communication interface 627. The communication interface 627 allows software and data to be transferred between computing device 600 and external devices via a communication path 626. In embodiments of the disclosure, the communication interface 627 permits data to be transferred between the computing device 600 and a data communication network, such as a public data or private data communication network. The communication interface 627 may be used to exchange data between different computing devices 600 which such computing devices 600 form part an interconnected computer network. Examples of a communication interface 627 can include a modem, a network interface (such as an Ethernet card), a communication port (such as a serial, parallel, printer, GPIB, IEEE 1394, RJ45, USB), an antenna with associated circuitry and the like. The communication interface 627 may be wired or may be wireless. Software and data transferred via the communication interface 627 are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communication interface 627. These signals are provided to the communication interface via the communication path 626.

[0068] As shown in Fig. 6, the computing device 600 further includes a display interface 602 which performs operations for rendering images to an associated display 655 and an audio interface 652 for performing operations for playing audio content via associated speaker(s) 657.

[0069] As used herein, the term "computer program product" may refer, in part, to removable storage medium 677, removable storage unit 622, a hard disk installed in storage drive 612, or a carrier wave carrying software over communication path 626 (wireless link or cable) to communication interface 627. Computer readable storage media refers to any non-transitory, non-volatile tangible storage medium that provides recorded instructions and/or data to the computing device 600 for execution and/or processing. Examples of such storage media include magnetic tape, CD-ROM, DVD, Blu-ray™ Disc, a hard disk drive, a ROM or integrated circuit, a solid state storage drive (such as a USB flash drive, a flash memory device, a solid state drive or a memory card), a hybrid drive, a magneto-optical disk, or a computer readable card such as a PCMCIA card and the like, whether or not such devices are internal or external of the computing device 600. Examples of transitory or non-tangible computer readable transmission media that may also participate in the provision of software,

application programs, instructions and/or data to the computing device 600 include radio or infra-red transmission channels as well as a network connection to another computer or networked device, and the Internet or Intranets including e-mail transmissions and information recorded on Websites and the like.

[0070] The computer programs (also called computer program code) are stored in main memory 608 and/or secondary memory 610. Computer programs can also be received via the communication interface 627. Such computer programs, when executed, enable the computing device 600 to perform one or more features of embodiments discussed herein. In embodiments, the computer programs, when executed, enable the processor 607 to perform features of the above-described embodiments. Accordingly, such computer programs represent controllers of the computer system 600.

[0071] Software may be stored in a computer program product and loaded into the computing device 600 using the removable storage drive 617, the storage drive 612, or the interface 650. The computer program product may be a non-transitory computer readable medium. Alternatively, the computer program product may be downloaded to the computer system 600 over the communication path 626. The software, when executed by the processor 607, causes the computing device 600 to perform the necessary operations to execute the method 300 as shown in Fig. 3.

[0072] It is to be understood that the embodiment of Fig. 6 is presented merely by way of example to explain the operation and structure of the system 600. Therefore, in some embodiments one or more features of the computing device 600 may be omitted. Also, in some embodiments, one or more features of the computing device 600 may be combined together. Additionally, in some embodiments, one or more features of the computing device 600 may be split into one or more component parts.

[0073] It will be appreciated that the elements illustrated in Fig. 6 function to provide means for performing the various functions and operations of the system as described in the above embodiments.

[0074] When the computing device 600 is configured to realise the system 100 to process a transaction, the system 100 will have a non-transitory computer readable medium having stored thereon an application which when executed causes the system 100 to perform steps comprising: (i) receiving, from a server associated with a merchant, a transaction request comprising a user account identifier and a transaction amount and (ii) verifying, if the user account identifier belongs to a pre-registered user account of an associated payment

network. Upon a successful verification of the user account identifier, the system 100 can also perform the steps comprising (iii) recording the transaction amount on an account belonging to the associated payment network and (iv) transmitting, to a server associated with the payment network, a transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account.

[0075] It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present disclosure as shown in the specific embodiments without departing from the spirit or scope of the disclosure as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

Claims

1. A method for processing a transaction, the method comprising:
 - receiving, from a server associated with a merchant, a transaction request comprising a user account identifier and a transaction amount;
 - verifying, if the user account identifier belongs to a pre-registered user account of an associated payment network;
 - upon a successful verification of the user account identifier, recording the transaction amount on an account belonging to the associated payment network; and
 - transmitting, to a server associated with the payment network, a transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account.
2. The method of claim 1, wherein the transaction request is based on a communication between a merchant device and the server associated with the merchant, said communication being in accordance with a first communication protocol; and
 - wherein the transaction authorisation message is configured to initiate a communication between the server associated with the payment network and a user device, said communication being in accordance with a second communication protocol.
3. The method of claim 2, wherein the transaction request is formatted in accordance with the first communication protocol and the transaction authorisation message is formatted in accordance with the second communication protocol.
4. The method of any one of claims 1-3, further comprising the steps of:
 - generating, in response to recording of the transaction amount on the account belonging to the associated payment network, a message indicative of successful processing of the transaction request; and
 - transmitting the message to the server associated with the merchant.
5. The method of any one of claims 1-4, wherein pre-registering the user account comprises:
 - receiving, from the server associated with the payment network, a user account association request comprising user information and user account information;

generating the user account identifier based on at least the user information and the user account information;

associating the user information and the user account information with the user account identifier; and

transmitting, to the server associated with the payment network, a confirmation message indicative of successful account association, the confirmation message comprising at least the user account identifier.

6. The method of any one of claims 1-5, wherein the user account identifier comprises a machine-readable optical code.
7. The method of any one of claims 1-6, wherein the user account comprises a digital wallet.
8. A system for processing a transaction, the system comprising:
 - a receiver configured to receive, from a server associated with a merchant, a transaction request comprising a user account identifier and a transaction amount;
 - a processor configured to verify if the user account identifier belongs to a pre-registered user account of an associated payment network and, upon a successful verification of the user account identifier, record the transaction amount on an account belonging to the associated payment network; and
 - a transmitter configured to transmit, upon the successful verification of the user account identifier, a transaction authorisation message to a server associated with the payment network, the transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account.
9. The system of claim 8, wherein the transaction request is based on a communication between a merchant device and the server associated with the merchant, said communication being in accordance with a first communication protocol; and
 - wherein the transaction authorisation message is configured to initiate a communication between the server associated with the payment network and a user device, said communication being in accordance with a second communication protocol.
10. The system of claim 9, wherein the transaction request is formatted in accordance with the first communication protocol and the transaction authorisation message is formatted in accordance with the second communication protocol.

11. The system of any one of claims 7-10, wherein the processor is further configured to generate, in response to recordal of the transaction amount on the account belonging to the associated payment network, a message indicative of successful processing of the transaction request; and
wherein the transmitter is further configured to transmit the message to the server associated with the merchant.
12. The system of any one of claims 7-11, wherein:
the receiver is further configured to receive, from the server associated with the payment network, a user account association request comprising user information and user account information;
the processor is further configured to:
generate the user account identifier based on at least the user information and the user account information; and
associate the user information and the user account information with the user account identifier; and
the transmitter is further configured to transmit, to the server associated with the payment network, a confirmation message indicative of successful account association, the confirmation message comprising at least the user account identifier.
13. The system of any one of claims 7-12, wherein the user account identifier comprises a machine-readable optical code.
14. The system of any one of claims 7-13, wherein the user account comprises a digital wallet.
15. A system for processing a transaction, the system comprising:
at least one processor; and
at least one memory including computer program code;
the at least one memory and the computer program code configured to, with the at least one processor, cause the system at least to:
receive, from a server associated with a merchant, a transaction request comprising a user account identifier and a transaction amount;
verify, if the user account identifier belongs to a pre-registered user account of an associated payment network;

upon a successful verification of the user account identifier, record the transaction amount on an account belonging to the associated payment network; and
 transmit, to a server associated with the payment network, a transaction authorisation message comprising the user account identifier and the transaction amount to be recorded on the user account.

16. The system of claim 15, wherein the transaction request is based on a communication between a merchant device and the server associated with the merchant, said communication being in accordance with a first communication protocol; and
 wherein the transaction authorisation message is configured to initiate a communication between the server associated with the payment network and a user device, said communication being in accordance with a second communication protocol.
17. The system of claim 15 or 16, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the system further to:
 generate, in response to recordal of the transaction amount on the account belonging to the associated payment network, a message indicative of successful processing of the transaction request; and
 transmit the message to the server associated with the merchant.
18. The system of any one of claims 15-17, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the system further to:
 receive, from the server associated with the payment network, a user account association request comprising user information and user account information;
 generate the user account identifier based on at least the user information and the user account information;
 associate the user information and the user account information with the user account identifier; and
 transmit, to the server associated with the payment network, a confirmation message indicative of successful account association, the confirmation message comprising at least the user account identifier.
19. The system of any one of claims 15-18, wherein the user account identifier comprises a machine-readable optical code.

20. The system of any one of claims 15-19, wherein the user account comprises a digital wallet.