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# SYSTEM AND METHOD FOR DELIVERYING MULTI-CURRENCY FEATURES ONTO AN EXISTING CARD

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# TITLE: "SYSTEM AND METHOD FOR DELIVERYING MULTI-CURRENCY FEATURES ONTO AN EXISTING CARD"

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## TECHNICAL FIELD

The present subject matter relates to field of financial services using card, more particularly, but not exclusively to a system and method for delivering multi-currency features onto an existing card.

## BACKGROUND

Travelling overseas for a business trip or holiday with funding card associated with only home currency may not be convenient to cardholders. Cardholders may not be able to use such card during shopping, touring, transactions and so on. The funding card may be - debit card or credit card which is issued for transactions related to home currency. In some cases, such funding card may be linked to super card in order to fund transactions made using super card. The super card is a credit card that may be used as a debit card when there is urgent need for funds or in case of any emergency. By linking the funding card with the super card, the super card may be used to withdraw cash from credit limit of a customer. The funding card must be issued to person who applied for the super card. The home currency is the currency that is used in cardholder's own country. Every transaction requires exchange of currency between the cardholder and a merchant.

Conventional method to buy foreign currencies requires customer to visit local bank branch. The bank generally offers competitive exchange rates and charges, to buy foreign currencies. Similarly, foreign currencies may be bought from travel agents at certain exchange rate offered. Foreign Exchange (forex or FX) is trading of one currency for another. For example, one may swap U.S. dollars for euros. The exchange rate is the value of one nation's currency versus the currency of another nation or economic zone. For example, information on how many U.S. dollars does it take to buy one euro is conveyed by the exchange rate. In order to purchase foreign currency, bank/issuer needs to set up a consumer experience and infrastructure to allow consumers to load funds into a multi-currency wallet and convert those funds into another currency. The bank/issuer needs to filter all inbound transactions and send those that correspond to a multi-currency balances to a new workflow. The bank/issuer needs to authorize and clear the transaction against the correct foreign currency balance. During authorizing and clearing, the bank/issuer may ignore to convert amount which visa sends in authorization and clearing messages. Thus, the conventional method involves foreign exchange settlement risk. The foreign exchange settlement risk is the risk of loss when a bank/issuer in a foreign exchange transaction pays the currency it sold but does not receive the currency it bought.

## BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and, together with the description, serve to explain the disclosed principles. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the figures to reference like features and components. Some embodiments of device or system and/or methods in accordance with embodiments of the present subject matter are now described, by way of example only, and with reference to the accompanying figures, in which:

**Figure 1** illustrates an exemplary environment of a system for delivering multi-currency features onto an existing card, in accordance with some embodiments of the present disclosure;

**Figure 2** illustrates a schematic flow indicating a method for delivering multi-currency features onto an existing card, in accordance with some embodiments of the present disclosure;

**Figures 3a, 3b, 3c, 3d and 3e** illustrate flow diagrams showing methods for delivering multi-currency features onto an existing card, in accordance with some embodiments of the present disclosure;

**Figure 4** illustrates a schematic flow indicating a method for delivering multi-currency features with single currency settlement, in accordance with some embodiments of the present disclosure;

**Figures 4a, 4b, 4c and 4d** illustrate flow diagrams showing methods for delivering multi-currency features with single currency settlement, in accordance with some embodiments of the present disclosure; and

**Figure 5** illustrates a block diagram of an exemplary computer system for implementing embodiments consistent with the present disclosure.

The figures depict embodiments of the disclosure for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles of the disclosure described herein.

## DESCRIPTION OF THE DISCLOSURE

In the present document, the word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any embodiment or implementation of the present subject matter described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.

While the disclosure is susceptible to various modifications and alternative forms, specific embodiment thereof has been shown by way of example in the drawings and will be described in detail below. It should be understood, however that it is not intended to limit the disclosure to the particular forms disclosed, but on the contrary, the disclosure is to cover all modifications, equivalents, and alternative falling within the spirit and the scope of the disclosure.

The terms “comprises”, “comprising”, or any other variations thereof, are intended to cover a non-exclusive inclusion, such that a setup, device or method that comprises a list of components or steps does not include only those components or steps but may include other components or steps not expressly listed or inherent to such setup or device or method. In other words, one or more elements in a device or system or apparatus proceeded by “comprises… a” does not, without more constraints, preclude the existence of other elements or additional elements in the device or system or apparatus.

The terms "an embodiment", "embodiment", "embodiments", "the embodiment", "the embodiments", "one or more embodiments", "some embodiments", and "one embodiment" mean "one or more (but not all) embodiments of the invention(s)" unless expressly specified otherwise.

The terms "including", "comprising", “having” and variations thereof mean "including but not limited to", unless expressly specified otherwise.

The present disclosure proposes a system and method for delivering multi-currency features onto an existing card without re-issuing of a new card. The proposed system uses virtual multi-currency ledgers to implement multi-currency payments using the existing card and issuer mobile banking app. The proposed system lightens the burden of enabling multi-currency wallets by the issuer or issuer processor.

**Figure 1** illustrates an exemplary environment 100 of a system 101 which is configured to deliver multi-currency features onto an existing card. The existing cards are used for payment transactions to merchants, shopkeepers and like. The existing cards onto which multi-currency features maybe implemented include credit cards, debit cards, charge cards, ATM cards, fleet cards pre-paid cards and so on. To deliver the multi-currency features, there is no need of re-issuing the existing cards using the proposed system 101. Clients of issuer may experience the multi-currency features by accessing issuer mobile banking app through a travel mode layer. The environment 100 for delivering the multi-currency features onto the existing cards includes a cardholder 102, a cross-border merchant 103, a bank/issuer 104, a communication network 105 and the system 101. For example, consider a scenario where a cardholder 102 wants to make a purchase from the cross-border merchant 103. The cardholder 102 has an existing funding card which only carries a single balance in its home currency. The home currency is the currency that is used in own country of the cardholder 102. In order to make a purchase with the cross-border merchant 103, the existing card needs to have a multi-currency settlement Bank Identification Number (BIN). BIN is a unique 6 or 8-digit number assigned by International Organization for Standardization (ISO) to service provider like VISA, and then by VISA to processors, acquirers, issuers and other financial institutions involved in transaction process. The BIN is the first six or eight digits of account number of the cardholder 102. The BIN is also known as Issuer Identification Number (IIN). Initially, the multi-currency balances are zero. The multi-currency balances are stored in a number of virtual ledgers, one for each currency, linked to the existing card. Virtual ledger is a system of recording the multi-currency balances. The funding card is debited with an amount in the home currency for purchasing foreign currency. The amount debited in the home currency is used to purchase the foreign currency from currency cloud or similar entity. In an embodiment, the currency cloud provides exchange rate to the cardholder 102 to purchase the foreign currency. The exchange rate is the value of one nation's currency versus the currency of another nation or economic zone. The currency cloud permits the bank/issuer 104 to purchase the foreign currency with the exchange rate provided to the cardholder 102. Further, issuer processor forwards authorization of the multi-currency transaction to visa multi-currency service. The visa multi-currency service maintains authorisation and clearing of multi-currency transactions made against the virtual ledger. On receipt of clearing message, the authorisation is reversed by crediting the authorisation amount and the virtual ledger is debited with the clearing amount. The multi-currency service is accessed through a travel mode layer that is plugged into the issuer mobile

banking app. When the travel mode layer is switched on, the travel mode layer allows the cardholder 102 to activate a currency account. The currency account is loaded with funds from the existing funding card. The travel mode layer provides certain services to the cardholder 102 such as viewing balance, transaction history against the currency account and deactivating the currency account. Record of ledger movements is then passed to the bank/issuer 104 in order for them to settle with visa, either through the currency cloud account or the existing multi-currency settlement account. The bank/issuer 104 settles with visa in one of the supported foreign currency from the issuer multi-currency settlement account. Thus, using the proposed system 101, settlement risk is eliminated during purchasing of the foreign currency.

In an embodiment, the system 101, the cardholder 102, the cross-border merchant 103, and the bank/issuer 104 may communicate via the communication network 105, for delivering the multi-currency features onto an existing card. The communication network 105 may include, without limitation, a direct interconnection, Local Area Network (LAN), Wide Area Network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, and the like. In an embodiment, the system 101 may be implemented in a server configured to deliver the multi-currency features on the existing card. In an embodiment, such server may be a dedicated server or a cloud-based server.

Further, the system 101 may include one or more processor 106, I/O interface 107, and a memory 108. In some embodiments, the memory 108 may be communicatively coupled to the one or more processor 106. The memory 108 stores instructions, executable by the one or more processor 106, which, on execution, may cause the system 101 to deliver multi-currency features onto the existing card, as disclosed in the present disclosure. In an embodiment, the memory 108 may include one or more modules 109 and data 110. The one or more modules 109 may be configured to perform the steps of the present disclosure using the data 110, to deliver multi-currency features onto the existing card. In an embodiment, each of the one or more modules 109 may be a hardware unit which may be present outside the memory 108 and coupled with the system 101. The system 101 may be implemented in a variety of computing systems, such as a laptop computer, a desktop computer, a Personal Computer (PC), a notebook, a smartphone, a tablet, e-book readers, a server, a network server, a cloud-based server and the like. In an embodiment, the system 101 may be a dedicated server or may be a cloud-based server.

**Figure 2** illustrates a schematic flow indicating a method for delivering multi-currency features onto the existing card, in accordance with some embodiments of the present disclosure.

In an embodiment, the cardholder 102 makes a purchase with the cross-border merchant 103. To make the purchase with the cross-border merchant 103, the cardholder 102 uses an issuer mobile banking app with travel mode layer. Flows involved in completing the purchase include foreign currency purchase flow, authorization flow, clearing flow, issuer managed settlement flow and direct settlement flow. In an embodiment, the foreign currency purchase flow is carried out between the cardholder 102, visa multi-currency service environment, issuer processor environment and currency cloud environment. The steps of the foreign currency purchase flow are shown in **Figure 3a**. In an embodiment, the authorization flow for purchasing the foreign currency is involved between the cardholder 102, the cross-border merchant 103, bank of the cross-border merchant referred to as acquirer in **Figure 2**, visa network, the issuer processor environment and the visa multi-currency service environment. The steps of the authorization flow are shown in **Figure 3b**. In an embodiment, the clearing flow for purchasing the foreign currency is involved between the bank of the cross-border merchant, the visa network, the issuer processor environment and the visa multi-currency service environment. The steps of the clearing flow are shown in **Figure 3c**. In an embodiment, the issuer managed settlement flow for purchasing the foreign currency is involved between the currency cloud environment, issuer environment, visa and the bank of the cross-border merchant. The steps of the issuer managed settlement flow are shown in **Figure 3d**. In an embodiment, the direct settlement flow for purchasing the foreign currency is involved between the currency cloud environment, the visa and the bank of the cross-border merchant. The steps of the direct settlement flow are shown in **Figure 3e**.

In an embodiment, flow diagram of **Figure 3a,** shows the foreign currency purchase flow initiated made by the cardholder 102.

At block 301 of **Figure 3a**, the cardholder 102, to purchase the foreign currency, adds the foreign currency to multi-currency wallet through the issuer mobile banking app. The mobile banking app is provided by the bank/issuer 104 to the cardholder 102 to purchase the foreign currency without re-issuing of new card.

At block 302 of **Figure 3a**, the cardholder 102 sends a request for the foreign currency exchange rate to the visa multi-currency service. The visa multi-currency service fetches the exchange rate from the currency cloud platform and displays the exchange rate to the cardholder 102 using the mobile banking app.

At block 303 of **Figure 3a**, the cardholder 102 confirms the amount of foreign currency to be purchased and purchase amount in the home currency that is to be debited from the funding card of the cardholder 102 using the mobile banking app.

At block 304 of **Figure 3a**, the foreign currency which is to be purchased, is added to the multi-currency wallet by making purchase from the funding card of the cardholder 102.

At block 305 of **Figure 3a**, the visa multi-currency service informs issuer processor to debit the purchase amount in the home currency from the funding card of the cardholder 102. The issuer processor in turn credits issuer Account Receivable (AR) ledger with the purchase amount in the home currency. The issuer AR ledger is an accounting ledger which shows transaction and payment history of the cardholder 102. Further, the issuer processor also debits cardholder account ledger with the purchase amount in the home currency.

At block 306 of **Figure 3a**, the visa multi-currency service purchases the foreign currency from the currency cloud platform at the exchange rate provided by the currency cloud platform to the cardholder 102. The currency cloud platform in turn debits the purchase amount in the home currency from issuer currency cloud home currency sub-account. Further, the currency cloud platform credits issuer currency cloud foreign currency sub-account with the foreign currency purchased by the cardholder 102.

At block 307 of **Figure 3a**, the visa multi-currency service credits the foreign currency purchased by the cardholder 102 to the multi-currency virtual ledger of the cardholder 102.

In an embodiment, flow diagram of **Figure 3b,** shows the authorisation flow for the foreign currency purchased. The authorisation flow is initiated when the cardholder 102 makes the purchase of the foreign currency from the currency cloud environment.

At block 308 of **Figure 3b**, the cardholder 102 makes purchase in the foreign currency with the cross-border merchant 103.

At block 309 of **Figure 3b**, the cross-border merchant 103 requests for payment authorization in the foreign currency to the bank of the cross-border merchant referred to as acquirer in **Figure 2**. The acquirer submits the payment authorization in the foreign currency to visa net. Further, the visa net sends the payment authorization in the foreign currency to the issuer processor. Upon receiving the payment authorization, the issuer processor forwards the payment authorization to the visa multi-currency service.

At block 310 of **Figure 3b**, the visa multi-currency service debits the multi-currency virtual ledger of the cardholder 102 with the payment authorization amount.

In an embodiment, flow diagram of **Figure 3c,** shows the clearing flow for the foreign currency purchased. The clearing flow is initiated when the authorization amount is debited from the multi-currency virtual ledger of the cardholder 102.

At block 311 of **Figure 3c**, the acquirer submits a clearing message for the foreign currency to the visa net after the authorization amount is debited from the multi-currency virtual ledger of the cardholder 102.

At block 312 of **Figure 3c**, upon receiving the clearing message for the foreign currency purchased, the visa net sends the clearing message for the foreign currency to the issuer processor.

At block 313 of **Figure 3c**, the issuer processor forwards the clearing message received by the visa net to the visa multi-currency service.

At block 314 of **Figure 3c**, the visa multi-currency service then credits the multi-currency virtual ledger of the cardholder 102 with the payment authorization amount.

At block 315 of **Figure 3c**, the visa multi-currency service debits the multi-currency virtual ledger of the cardholder 102 with the clearing amount after crediting the payment authorization amount.

In an embodiment, flow diagram of **Figure 3d,** shows the issuer managed settlement flow. The issuer managed settlement flow is initiated when the multi-currency virtual ledger of the cardholder 102 is debited with the clearing amount.

At block 316 of **Figure 3d**, the issuer currency cloud foreign currency sub-account transfers the cleared amount in the foreign currency to issuer multi-currency settlement account.

At block 317 of **Figure 3d,** the issuer multi-currency settlement account forwards the transferred cleared amount in the foreign currency to visa.

At block 318 of **Figure 3d,** the acquirer receives the transferred cleared amount in the foreign currency sent by the visa.

In an embodiment, flow diagram of **Figure 3e,** shows the direct settlement flow of the foreign currency purchased. The direct settlement flow is initiated when the acquirer receives the cleared amount in the foreign currency.

At block 319 of **Figure 3e**, the cleared amount in the foreign currency is transferred from issuer currency cloud foreign currency sub-account to the visa.

At block 320 of **Figure 3e**, the visa then sends the cleared amount in the foreign currency to the acquirer and the purchase is completed between the cardholder 102 and the cross-border merchant 103.

**Figure 4** illustrates a schematic flow indicating a method for delivering multi-currency features with single currency settlement, in accordance with some embodiments of the present disclosure.

In an embodiment issuer processor implements Just in Time (JIT) funding model for multi-currency transactions made on the existing card. In the JIT funding model, funds move from an issuer programme funding account in the home currency to settlement account in the home currency.

Further, there is no need for the bank/issuer 104 to set multi-currency BIN or account with currency cloud for purchasing the foreign currency. In an embodiment, the cardholder 102 makes a purchase with the cross-border merchant 103. To make the purchase with the cross-border merchant 103, the cardholder 102 uses the issuer mobile banking app with travel mode layer. Flows involved in completing the purchase include foreign currency purchase flow, authorization flow, clearing flow, settlement flow. In an embodiment, the foreign currency purchase flow is involved between the cardholder 102, the visa multi-currency service

environment, the issuer processor environment and currency cloud environment. The steps of the foreign currency purchase flow are shown in **Figure 4a**. In an embodiment, the authorization flow for purchasing the foreign currency is involved between the cardholder 102, the cross-border merchant 103, bank of the cross-border merchant referred to as acquirer in **Figure 4**, the visa network, the issuer processor environment, the visa multi-currency service environment and the issuer environment. The steps of the authorization flow are shown in **Figure 4b**. In an embodiment, the clearing flow for purchasing the foreign currency is involved between the bank of the cross-border merchant, the visa network, the issuer processor environment, the visa multi-currency service environment and the issuer environment. The steps of the clearing flow are shown in **Figure 4c**. In an embodiment, the settlement flow for purchasing the foreign currency is involved between the issuer environment, visa and the bank of the cross-border merchant. The steps of the settlement flow are shown in **Figure 4d**.

In an embodiment, flow diagram of **Figure 4a**, shows the foreign currency purchase flow made by the cardholder 102.

At block 401 of **Figure 4a,** the cardholder 102 to purchase the foreign currency, adds the foreign currency to multi-currency wallet through the issuer mobile banking app. The mobile banking app is provided by the bank/issuer 104 to the cardholder 102 to purchase the foreign currency without re-issuing of new card.

At block 402 of **Figure 4a**, the cardholder 102 sends a request for the foreign currency exchange rate to the visa multi-currency service. The visa multi-currency service fetches the exchange rate from currency cloud platform and displays the exchange rate to the cardholder 102 using the mobile banking app.

At block 403 of **Figure 4a**, the cardholder 102 confirms the amount of foreign currency to be purchased and purchase amount in home currency that is to be debited from the funding card of the cardholder 102 using the mobile banking app.

At block 404 of **Figure 4a,** the foreign currency which is to be purchased, is added to the multi-currency wallet by making purchase from the funding card of the cardholder 102.

At block 405 of **Figure 4a,** the visa multi-currency service informs the issuer processor to debit the purchase amount in the home currency from the funding card of the cardholder 102. The

issuer processor in turn credits issuer AR ledger with the purchase amount in the home currency. Further, the issuer processor also debits cardholder account ledger with the purchase amount in the home currency.

At block 406 of **Figure 4a,** the visa multi-currency service credits the foreign currency purchased by the cardholder 102 to the multi-currency virtual ledger of the cardholder 102.

In an embodiment, flow diagram of **Figure 4b,** shows the authorisation flow for the foreign currency purchased. The authorization flow is initiated, when the cardholder 102 makes the purchase of the foreign currency from the currency cloud environment.

At block 407 of **Figure 4b,** the cardholder 102 made purchase in the foreign currency with the cross-border merchant 103.

At block 408 of **Figure 4b,** the cross-border merchant 103 requests for payment authorization in the foreign currency to the bank of the cross-border merchant referred to as the acquirer in **Figure 4**. The acquirer upon receiving the payment authorization amount, submits the payment authorization in foreign currency to visa net. Further, the visa net sends the payment authorization in home currency to the issuer processor. Upon receiving the payment authorization amount, the issuer processor forwards the payment authorization in foreign currency to the visa multi-currency service.

At block 409 of **Figure 4b,** the visa multi-currency service debits the multi-currency virtual ledger of the cardholder 102 with the payment authorization amount.

At block 410 of **Figure 4b,** the issuer processor debits issuer programme funding account with the payment authorization amount.

At block 411 of **Figure 4b,** the issuer processor credits issuer single currency settlement account with the payment authorization amount.

In an embodiment, flow diagram of **Figure 4c**, shows the clearing flow for the foreign currency purchased. The clearing flow is initiated, when the authorization amount is credited to the issuer single currency settlement account.

At block 412 of **Figure 4c,** the acquirer submits a clearing message for the foreign currency to the visa net after the authorization amount is credited to the issuer single currency account.

At block 413 of **Figure 4c,** upon receiving the clearing message for the foreign currency purchased, the visa net sends the clearing message in the home currency to the issuer processor.

At block 414 of **Figure 4c,** the issuer processor forwards the clearing message in the foreign currency to the visa multi-currency service.

At block 415 of **Figure 4c,** upon receiving the clearing message, the visa multi-currency service credits the multi-currency virtual ledger of the cardholder 102 with the payment authorization amount in the foreign currency.

At block 416 of **Figure 4c,** the visa multi-currency service debits the multi-currency virtual ledger of the cardholder 102 with the clearing amount in the foreign currency. Upon debiting the clearing amount in the foreign currency, step at block 417 and step at block 418 is performed simultaneously.

At block 417 of **Figure 4c,** the issuer processor credits the issuer programme funding account with the payment authorization amount.

At block 418 of **Figure 4c,** the issuer processor debits the issuer single currency settlement account with the payment authorization amount.

Referring back to block 417, upon crediting the payment authorization amount, step at block 419 is performed. At block 419 of **Figure 4c,** the issuer processor debits the issuer programme funding account with the clearing amount.

Referring back to block 418, upon debiting the payment authorization amount, step at block 420 is performed. At block 420 of **Figure 4c,** the issuer processor credits the issuer single currency settlement account with the clearing amount.

In an embodiment, flow diagram of **Figure 4d,** shows the settlement flow of the foreign currency purchased. The settlement flow is initiated, when the issuer single currency settlement account is credited with the clearing amount.

At block 421 of **Figure 4d,** the cleared amount in the foreign currency is transferred from the issuer single currency settlement account to the visa.

At block 422 of **Figure 4d,** the visa sends the cleared amount in the foreign currency to the acquirer and the purchase is completed between the cardholder 102 and the cross-border merchant 103.

Advantages of the present disclosure

Embodiments of the present disclosure discloses a system and method to delivery multi-currency features onto an existing card using issuer mobile banking app through a travel mode layer. Thus, the settlement risk during purchase of the foreign currency is eliminated by performing multi-currency settlement.

Embodiments of the present disclosure minimises complexity and processing time of issuer processor by using virtual multi-currency ledger solution, instead of using multiple cards for each foreign currency.

Computing System

**Figure 5** illustrates a block diagram of an exemplary computer system 500 for implementing embodiments consistent with the present disclosure. In an embodiment, the computer system 500 is used to implement the system 101 for delivering multi-currency features onto an existing card. The computer system 500 may include a central processing unit (“CPU” or “processor”) 502. The processor 502 may include at least one data processor for executing processes in Virtual Storage Area Network. The processor 502 may include specialized processing units such as, integrated system (bus) controllers, memory management control units, floating point units, graphics processing units, digital signal processing units, etc.

The processor 502 may be disposed in communication with one or more input/output (I/O) devices 509 and 510 via I/O interface 501. The I/O interface 501 may employ communication protocols/methods such as, without limitation, audio, analog, digital, monaural, RCA, stereo, IEEE-1394, serial bus, universal serial bus (USB), infrared, PS/2, BNC, coaxial, component, composite, digital visual interface (DVI), high-definition multimedia interface (HDMI), radio frequency (RF) antennas, S-Video, VGA, IEEE 802.n /b/g/n/x, Bluetooth, cellular (e.g., code-division multiple access (CDMA), high-speed packet access (HSPA+), global system for mobile communications (GSM), long-term evolution (LTE), WiMax, or the like), etc.

Using the I/O interface 501, the computer system 500 may communicate with one or more I/O devices 509 and 510. For example, the input devices 509 may be an antenna, keyboard, mouse, joystick, (infrared) remote control, camera, card reader, fax machine, dongle, biometric reader, microphone, touch screen, touchpad, trackball, stylus, scanner, storage device, transceiver, video device/source, etc. The output devices 310 may be a printer, fax machine, video display (e.g., cathode ray tube (CRT), liquid crystal display (LCD), light-emitting diode (LED), plasma, Plasma Display Panel (PDP), Organic light-emitting diode display (OLED) or the like), audio speaker, etc.

In some embodiments, the computer system 500 may consist of the system 101. The processor 502 may be disposed in communication with a communication network 511 via a network interface 303. The network interface 303 may communicate with the communication network 511. The network interface 503 may employ connection protocols including, without limitation, direct connect, Ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc. The communication network 511 may include, without limitation, a direct interconnection, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, etc. Using the network interface 503 and the communication network 511, the computer system 500 may communicate with a cardholder 512, a cross-border merchant 513 and an issuer 514 to complete any transactions with foreign currency. The network interface 503 may employ connection protocols include, but not limited to, direct connect, Ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc.

The communication network 511 includes, but is not limited to, a direct interconnection, an e-commerce network, a peer to peer (P2P) network, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, Wi-Fi, and such. The first network and the second network may either be a dedicated network or a shared network, which represents an association of the different types of networks that use a variety of protocols, for example, Hypertext Transfer Protocol (HTTP), Transmission Control Protocol/Internet Protocol (TCP/IP), Wireless Application Protocol (WAP), etc., to communicate with each other. Further, the first network and the second network may include

a variety of network devices, including routers, bridges, servers, computing devices, storage devices, etc.

In some embodiments, the processor 502 may be disposed in communication with a memory 505 (e.g., RAM, ROM, etc. not shown in **Figure 5**) via a storage interface 504. The storage interface 504 may connect to memory 505 including, without limitation, memory drives, removable disc drives, etc., employing connection protocols such as, serial advanced technology attachment (SATA), Integrated Drive Electronics (IDE), IEEE-1394, Universal Serial Bus (USB), fibre channel, Small Computer Systems Interface (SCSI), etc. The memory drives may further include a drum, magnetic disc drive, magneto-optical drive, optical drive, Redundant Array of Independent Discs (RAID), solid-state memory devices, solid-state drives, etc.

The memory 505 may store a collection of program or database components, including, without limitation, user interface 506, an operating system 507, web browser 508 etc. In some embodiments, computer system 500 may store user/application data, such as, the data, variables, records, etc., as described in this disclosure. Such databases may be implemented as fault-tolerant, relational, scalable, secure databases such as Oracle ® or Sybase®.

The operating system 507 may facilitate resource management and operation of the computer system 500. Examples of operating systems include, without limitation, APPLE MACINTOSH® OS X, UNIX®, UNIX-like system distributions (E.G., BERKELEY SOFTWARE DISTRIBUTION™ (BSD), FREEBSD™, NETBSD™, OPENBSD™, etc.), LINUX DISTRIBUTIONS™ (E.G., RED HAT™, UBUNTU™, KUBUNTU™, etc.), IBM™ OS/2, MICROSOFT™ WINDOWS™ (XP™, VISTA™/7/8, 10 etc.), APPLE® IOS™, GOOGLE® ANDROID™, BLACKBERRY® OS, or the like.

In some embodiments, the computer system 500 may implement a web browser 508 stored program component. The web browser 508 may be a hypertext viewing application, such as Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, Apple Safari, etc. Secure web browsing may be provided using Hypertext Transport Protocol Secure (HTTPS), Secure Sockets Layer (SSL), Transport Layer Security (TLS), etc. Web browsers 508 may utilize facilities such as AJAX, DHTML, Adobe Flash, JavaScript, Java, Application Programming Interfaces (APIs), etc. In some embodiments, the computer system 500 may implement a mail

server stored program component. The mail server may be an Internet mail server such as Microsoft Exchange, or the like. The mail server may utilize facilities such as ASP, ActiveX, ANSI C++/C#, Microsoft .NET, Common Gateway Interface (CGI) scripts, Java, JavaScript, PERL, PHP, Python, WebObjects, etc. The mail server may utilize communication protocols such as Internet Message Access Protocol (IMAP), Messaging Application Programming Interface (MAPI), Microsoft Exchange, Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP), or the like. In some embodiments, the computer system 500 may implement a mail client stored program component. The mail client may be a mail viewing application, such as Apple Mail, Microsoft Entourage, Microsoft Outlook, Mozilla Thunderbird, etc.

Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer-readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer-readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The term “computer-readable medium” should be understood to include tangible items and exclude carrier waves and transient signals, i.e., be non-transitory. Examples include Random Access Memory (RAM), Read-Only Memory (ROM), volatile memory, non-volatile memory, hard drives, Compact Disc (CD) ROMs, DVDs, flash drives, disks, and any other known physical storage media.
media.

The described operations may be implemented as a method, system or article of manufacture using standard programming and/or engineering techniques to produce software, firmware, hardware, or any combination thereof. The described operations may be implemented as code maintained in a “non-transitory computer readable medium”, where a processor may read and execute the code from the computer readable medium. The processor is at least one of a microprocessor and a processor capable of processing and executing the queries. A non-transitory computer readable medium may include media such as magnetic storage medium (e.g., hard disk drives, floppy disks, tape, etc.), optical storage (CD-ROMs, DVDs, optical disks, etc.), volatile and non-volatile memory devices (e.g., EEPROMs, ROMs, PROMs, RAMs, DRAMs, SRAMs, Flash Memory, firmware, programmable logic, etc.), etc. Further, non-transitory computer-readable media may include all computer-readable media except for a transitory. The code implementing the described operations may further be implemented in

hardware logic (e.g., an integrated circuit chip, Programmable Gate Array (PGA), Application Specific Integrated Circuit (ASIC), etc.).

The illustrated steps are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments. Also, the words "comprising," "having," "containing," and "including," and other similar forms are intended to be equivalent in meaning and be open ended in that an item or items following any one of these words is not meant to be an exhaustive listing of such item or items, or meant to be limited to only the listed item or items. It must also be noted that as used herein and in the appended claims, the singular forms “a,” “an,” and “the” include plural references unless the context clearly dictates otherwise.

Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The term “computer readable medium” should be understood to include tangible items and exclude carrier waves and transient signals, i.e., are non-transitory. Examples include random access memory (RAM), read-only memory (ROM), volatile memory, non-volatile memory, hard drives, CD ROMs, DVDs, flash drives, disks, and any other known physical storage media.

Finally, the language used in the specification has been principally selected for readability and instructional purposes, and it may not have been selected to delineate or circumscribe the inventive subject matter. Accordingly, the disclosure of the embodiments of the disclosure is intended to be illustrative, but not limiting, of the scope of the disclosure.

With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

# SYSTEM AND METHOD FOR DELIVERING MULTI-CURRENCY FEATURES ONTO AN EXISTING CARD

## ABSTRACT

The present disclosure provides a system and a method to delivery multi-currency features on an existing card without re-issuing another card for multi-currency. The proposed system uses virtual multi-currency ledgers to implement multi-currency payments on the existing card. The system provides multi-currency features to clients of issuer and cardholders. The multi-currency features may be accessed with issuer mobile banking app through a travel mode layer. The system is transparent to merchants/acquirer. Also, the system minimises issuer and issuer processor development.

**Figures 2 and 4**

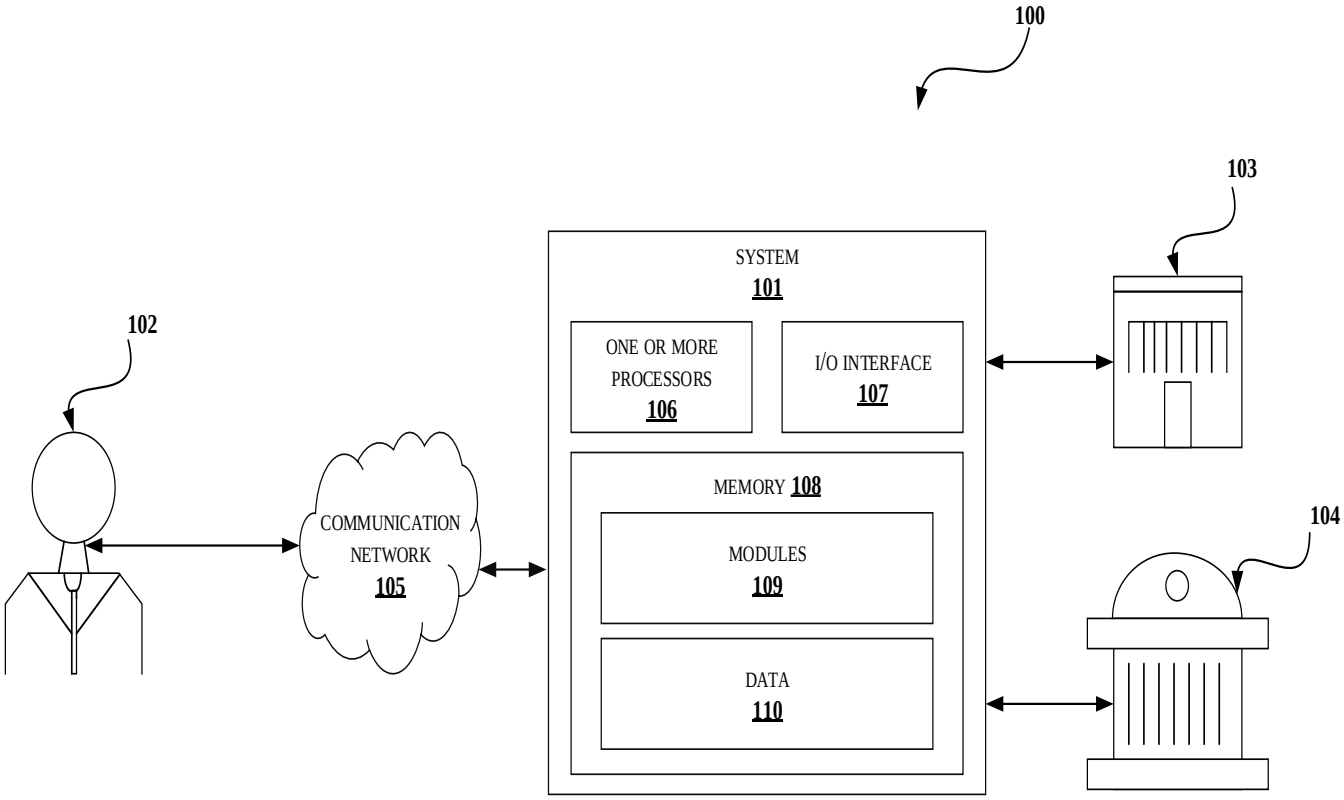
100
103
SYSTEM
101
102
ONE OR MORE PROCESSORS
106
I/O INTERFACE
107
MEMORY 108
COMMUNICATION NETWORK
105
MODULES
109
104
DATA
110

**Figure 1**

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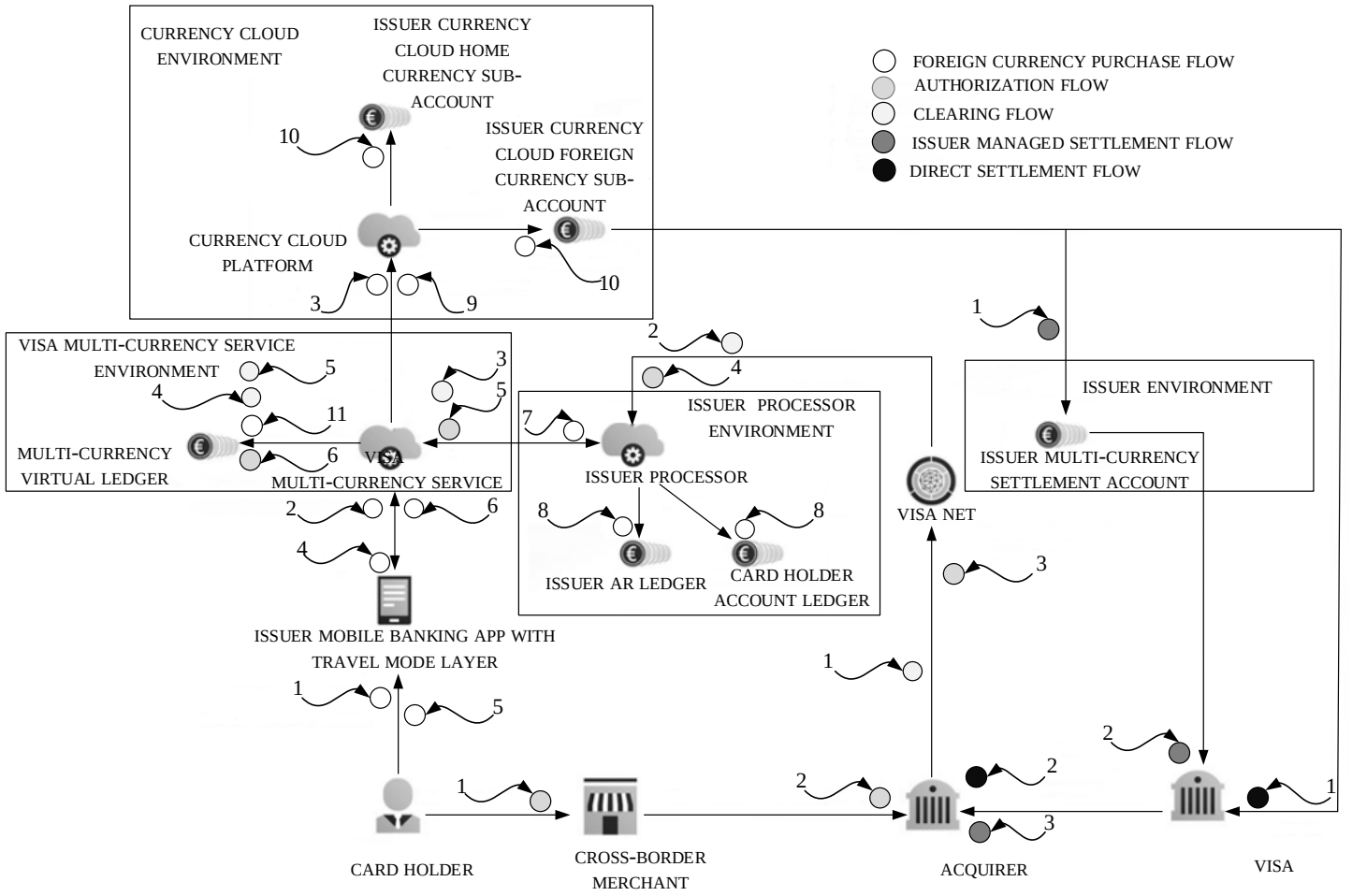
CURRENCY CLOUD ENVIRONMENT
ISSUER CURRENCY CLOUD HOME CURRENCY SUB-ACCOUNT
ISSUER CURRENCY CLOUD FOREIGN CURRENCY SUB-ACCOUNT
CURRENCY CLOUD PLATFORM
FOREIGN CURRENCY PURCHASE FLOW
AUTHORIZATION FLOW
CLEARING FLOW
ISSUER MANAGED SETTLEMENT FLOW
DIRECT SETTLEMENT FLOW
VISA MULTI-CURRENCY SERVICE ENVIRONMENT
MULTI-CURRENCY VIRTUAL LEDGER
MULTI-CURRENCY SERVICE
ISSUER PROCESSOR ENVIRONMENT
ISSUER PROCESSOR
ISSUER AR LEDGER
CARD HOLDER ACCOUNT LEDGER
ISSUER ENVIRONMENT
ISSUER MULTI-CURRENCY SETTLEMENT ACCOUNT
VISA NET
ISSUER MOBILE BANKING APP WITH TRAVEL MODE LAYER
CARD HOLDER
CROSS-BORDER MERCHANT
ACQUIRER
VISA

**Figure 2**

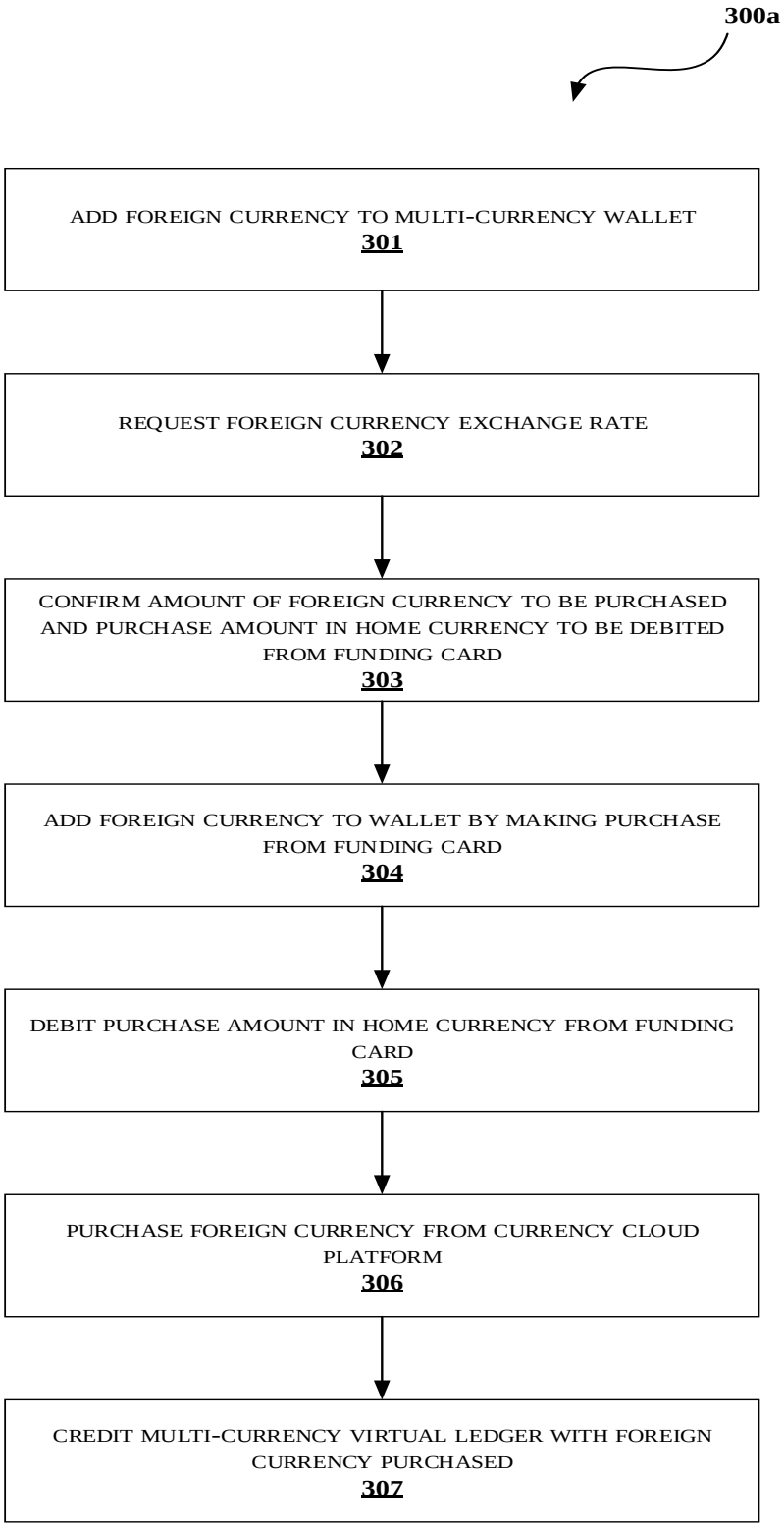
300a
ADD FOREIGN CURRENCY TO MULTI-CURRENCY WALLET
301
REQUEST FOREIGN CURRENCY EXCHANGE RATE
302
CONFIRM AMOUNT OF FOREIGN CURRENCY TO BE PURCHASED AND PURCHASE AMOUNT IN HOME CURRENCY TO BE DEBITED FROM FUNDING CARD
303
ADD FOREIGN CURRENCY TO WALLET BY MAKING PURCHASE FROM FUNDING CARD
304
DEBIT PURCHASE AMOUNT IN HOME CURRENCY FROM FUNDING CARD
305
PURCHASE FOREIGN CURRENCY FROM CURRENCY CLOUD PLATFORM
306
CREDIT MULTI-CURRENCY VIRTUAL LEDGER WITH FOREIGN CURRENCY PURCHASED
307

**Figure 3a**

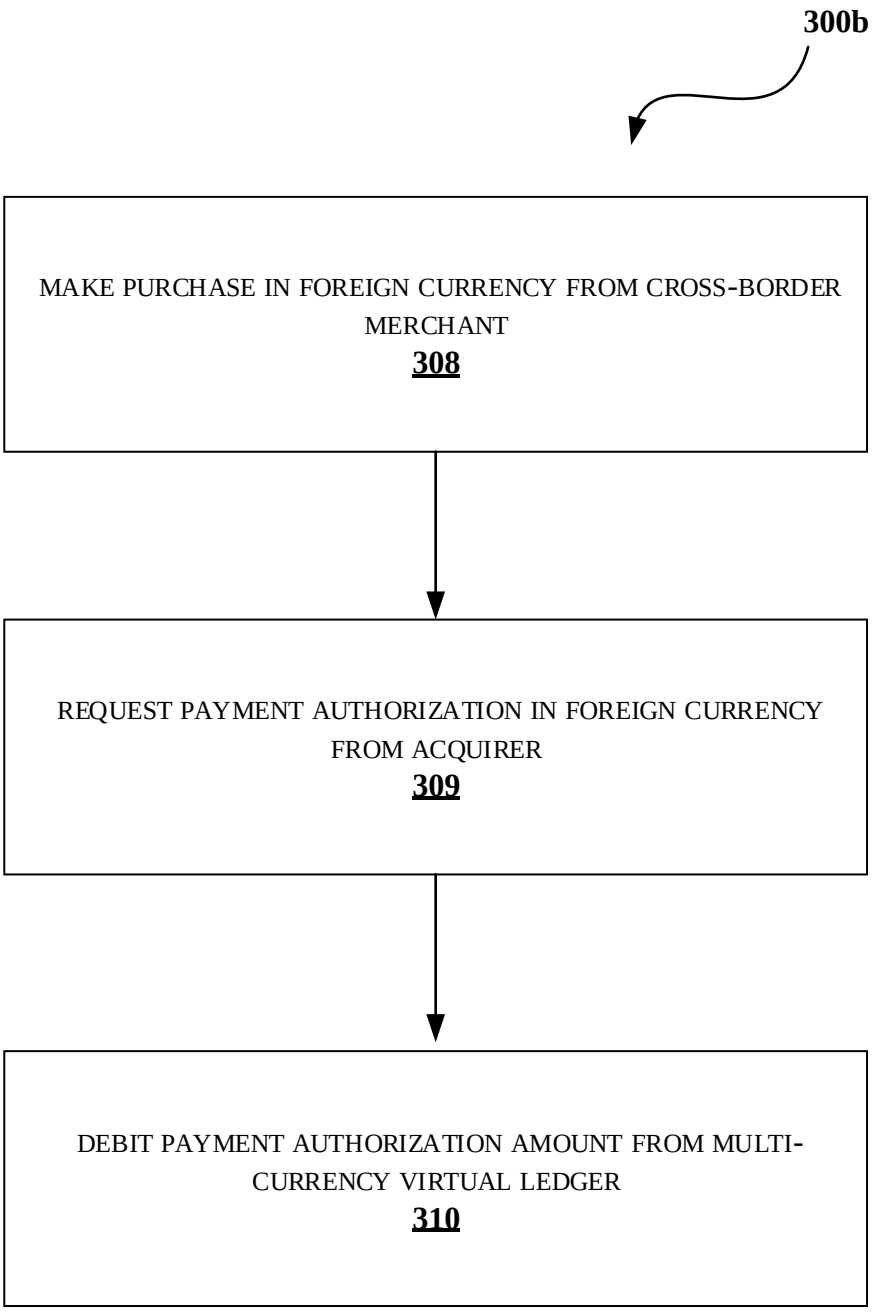
300b
MAKE PURCHASE IN FOREIGN CURRENCY FROM CROSS-BORDER MERCHANT
308
REQUEST PAYMENT AUTHORIZATION IN FOREIGN CURRENCY FROM ACQUIRER
309
DEBIT PAYMENT AUTHORIZATION AMOUNT FROM MULTI-CURRENCY VIRTUAL LEDGER
310

**Figure 3b**

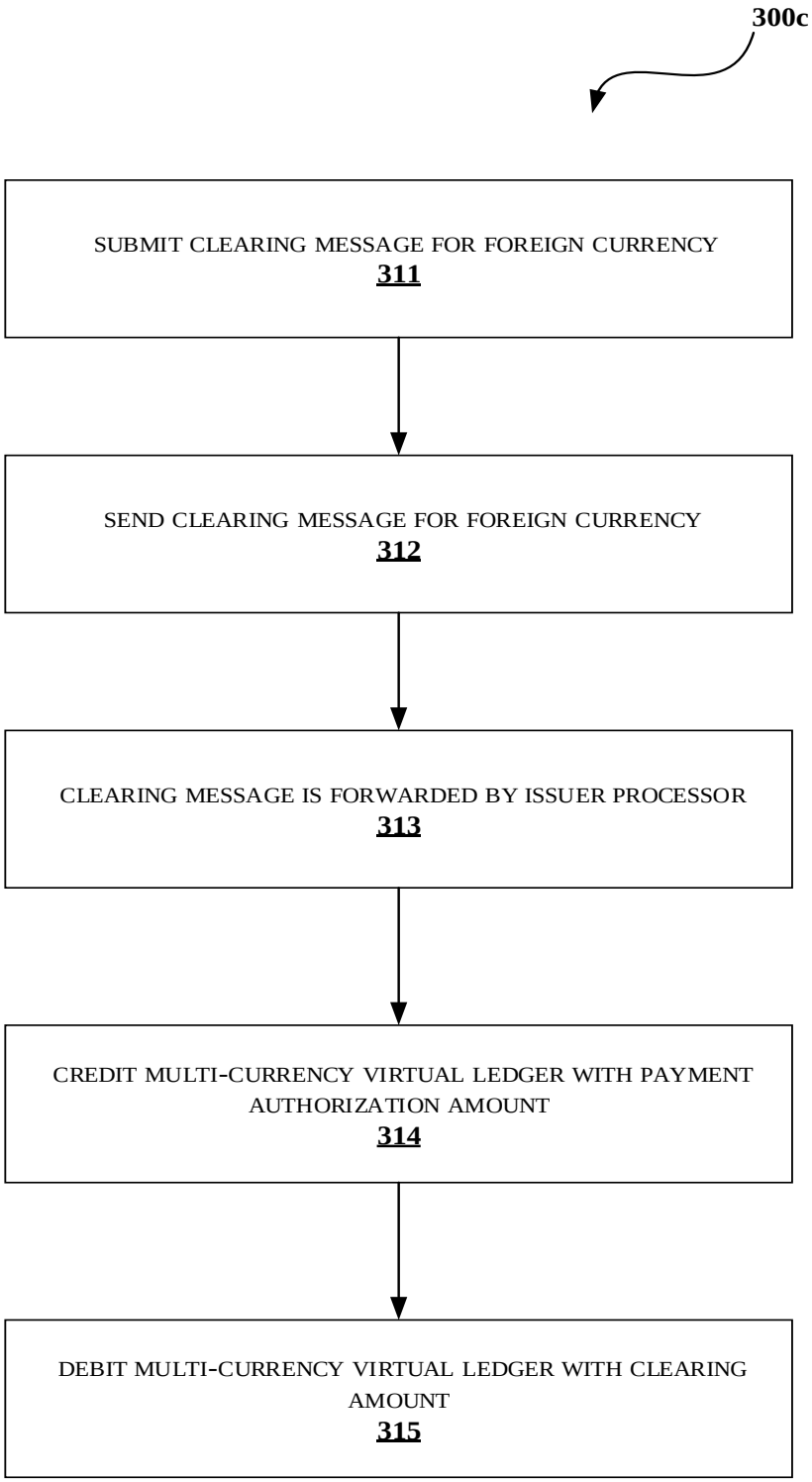
300c
SUBMIT CLEARING MESSAGE FOR FOREIGN CURRENCY
311
SEND CLEARING MESSAGE FOR FOREIGN CURRENCY
312
CLEARING MESSAGE IS FORWARDED BY ISSUER PROCESSOR
313
CREDIT MULTI-CURRENCY VIRTUAL LEDGER WITH PAYMENT AUTHORIZATION AMOUNT
314
DEBIT MULTI-CURRENCY VIRTUAL LEDGER WITH CLEARING AMOUNT
315

**Figure 3c**

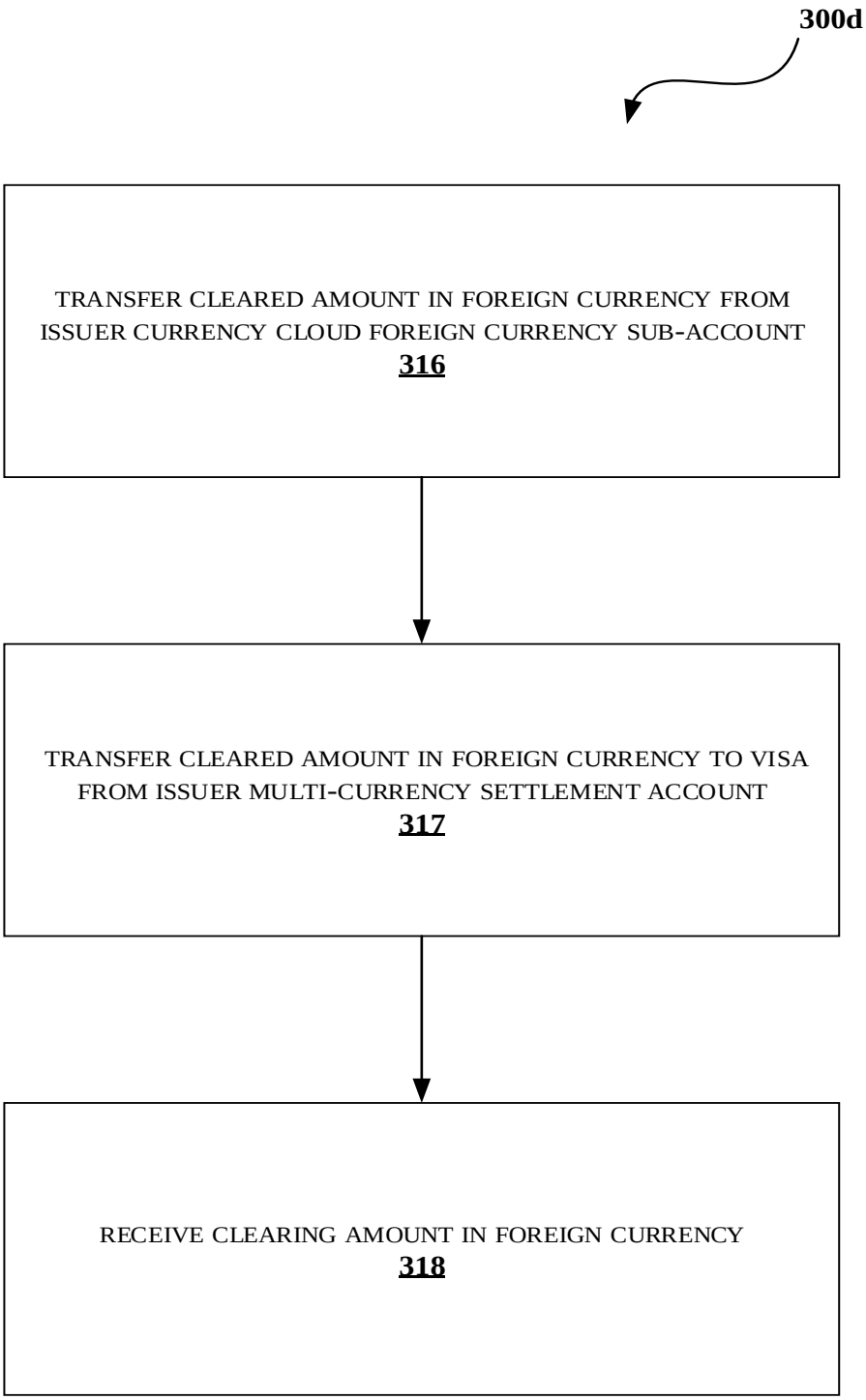
300d
TRANSFER CLEARED AMOUNT IN FOREIGN CURRENCY FROM ISSUER CURRENCY CLOUD FOREIGN CURRENCY SUB-ACCOUNT
316
TRANSFER CLEARED AMOUNT IN FOREIGN CURRENCY TO VISA FROM ISSUER MULTI-CURRENCY SETTLEMENT ACCOUNT
317
RECEIVE CLEARING AMOUNT IN FOREIGN CURRENCY
318

**Figure 3d**

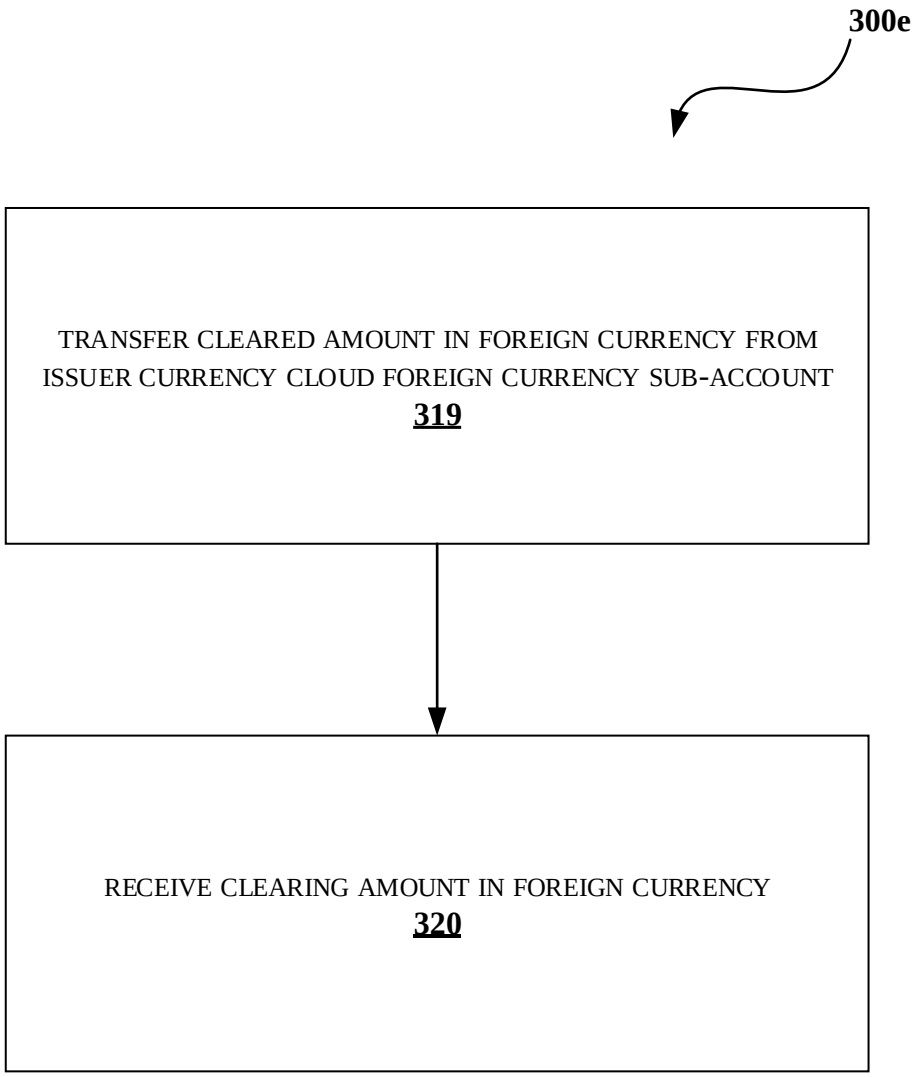
300e
TRANSFER CLEARED AMOUNT IN FOREIGN CURRENCY FROM ISSUER CURRENCY CLOUD FOREIGN CURRENCY SUB-ACCOUNT
319
RECEIVE CLEARING AMOUNT IN FOREIGN CURRENCY
320

**Figure 3e**

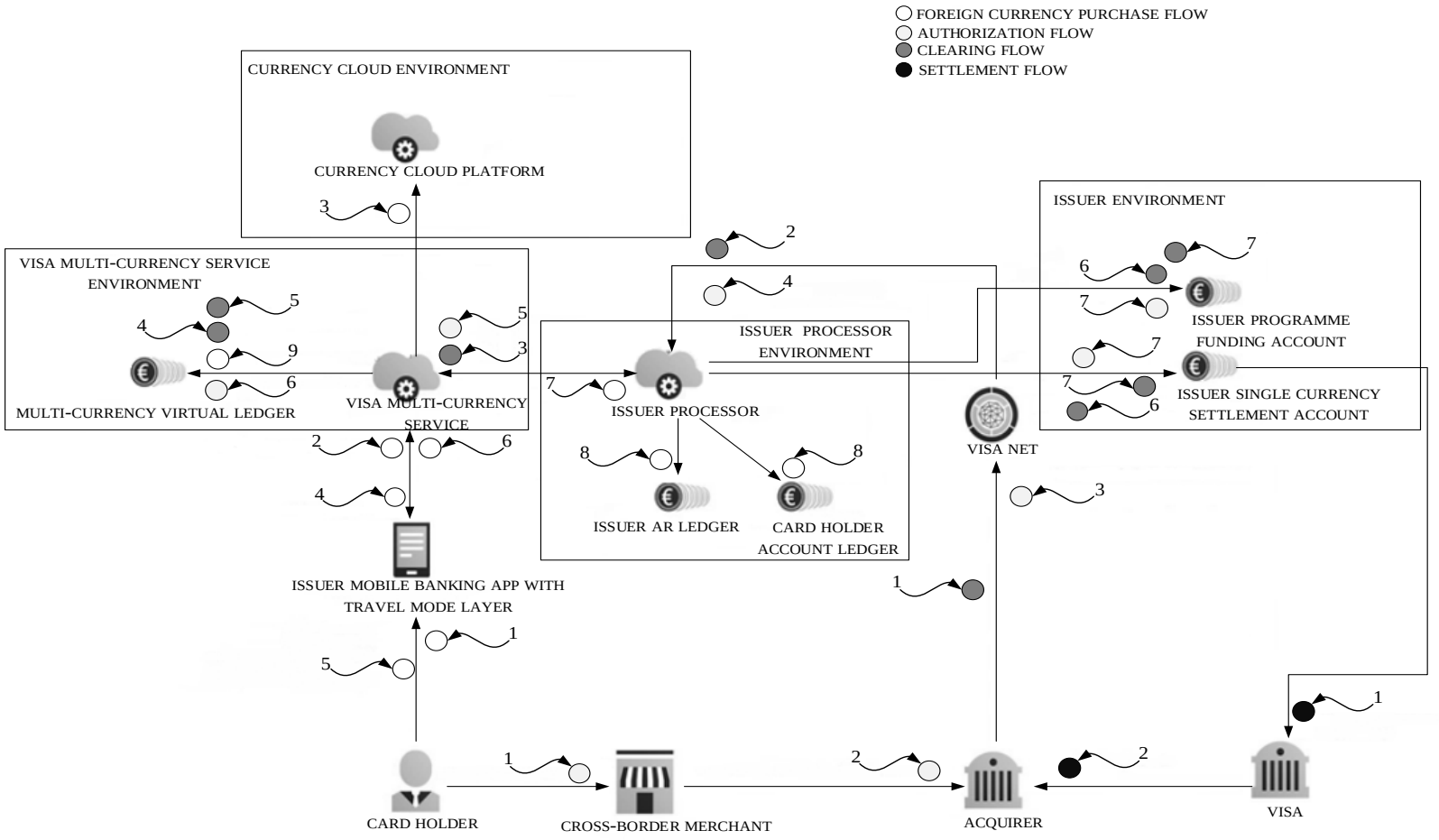
FOREIGN CURRENCY PURCHASE FLOW
AUTHORIZATION FLOW
CLEARING FLOW
SETTLEMENT FLOW
CURRENCY CLOUD ENVIRONMENT
CURRENCY CLOUD PLATFORM
VISA MULTI-CURRENCY SERVICE ENVIRONMENT
MULTI-CURRENCY VIRTUAL LEDGER
VISA MULTI-CURRENCY SERVICE
ISSUER PROCESSOR ENVIRONMENT
ISSUER PROCESSOR
ISSUER AR LEDGER
CARD HOLDER ACCOUNT LEDGER
ISSUER ENVIRONMENT
ISSUER PROGRAMME FUNDING ACCOUNT
ISSUER SINGLE CURRENCY SETTLEMENT ACCOUNT
VISA NET
ISSUER MOBILE BANKING APP WITH TRAVEL MODE LAYER
CARD HOLDER
CROSS-BORDER MERCHANT
ACQUIRER
VISA

**Figure 4**

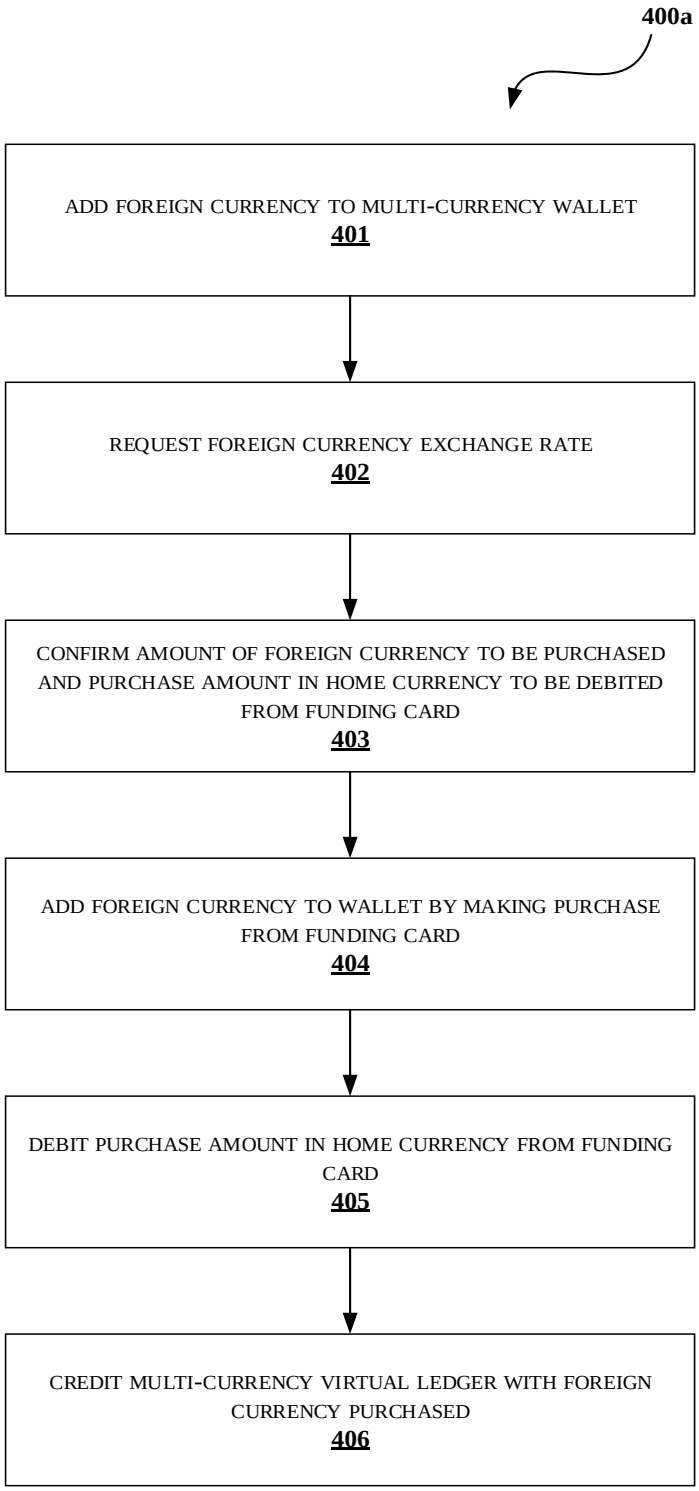
400a
ADD FOREIGN CURRENCY TO MULTI-CURRENCY WALLET
401
REQUEST FOREIGN CURRENCY EXCHANGE RATE
402
CONFIRM AMOUNT OF FOREIGN CURRENCY TO BE PURCHASED AND PURCHASE AMOUNT IN HOME CURRENCY TO BE DEBITED FROM FUNDING CARD
403
ADD FOREIGN CURRENCY TO WALLET BY MAKING PURCHASE FROM FUNDING CARD
404
DEBIT PURCHASE AMOUNT IN HOME CURRENCY FROM FUNDING CARD
405
CREDIT MULTI-CURRENCY VIRTUAL LEDGER WITH FOREIGN CURRENCY PURCHASED
406

**Figure 4a**

**10/13**

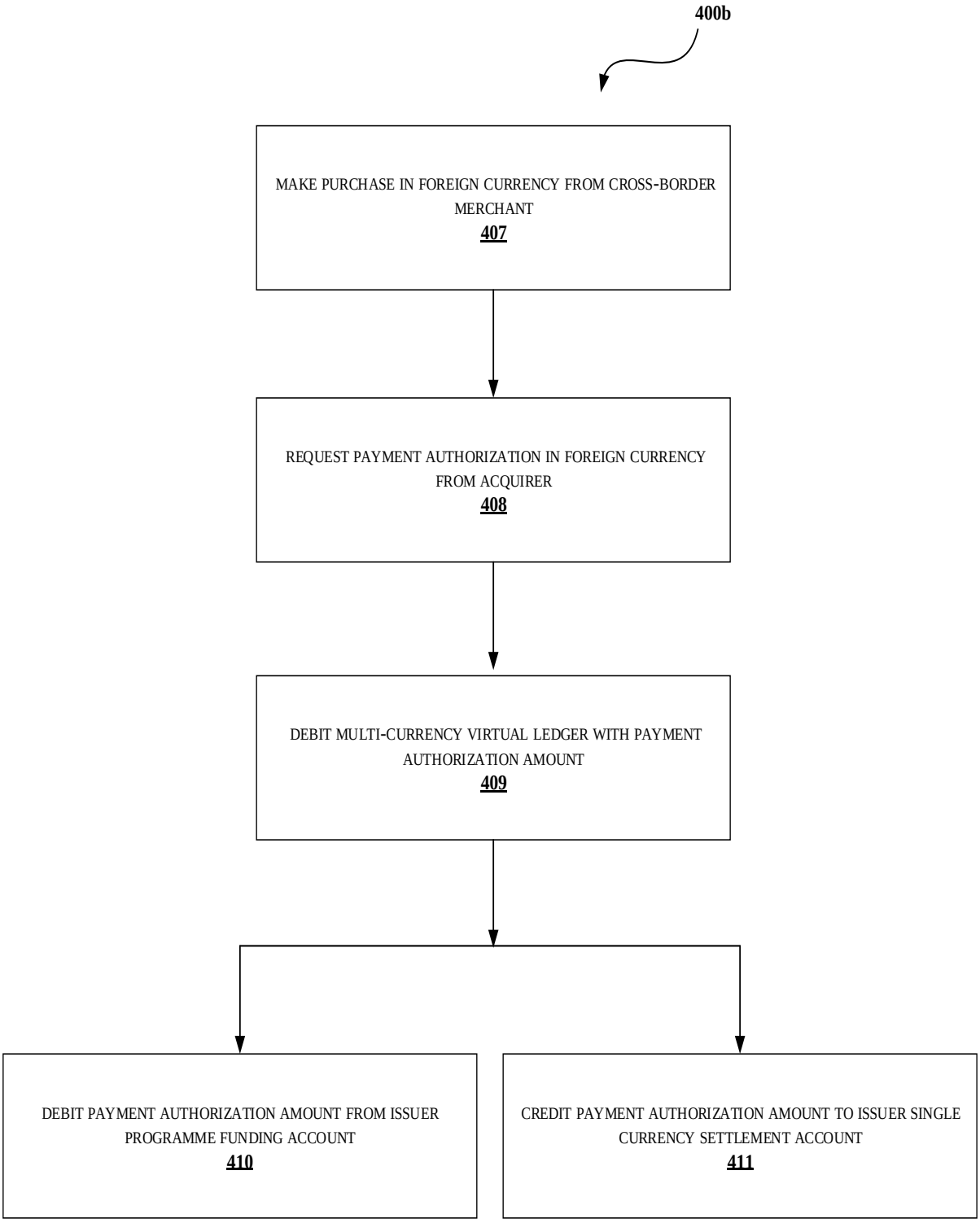


**Figure 4b**

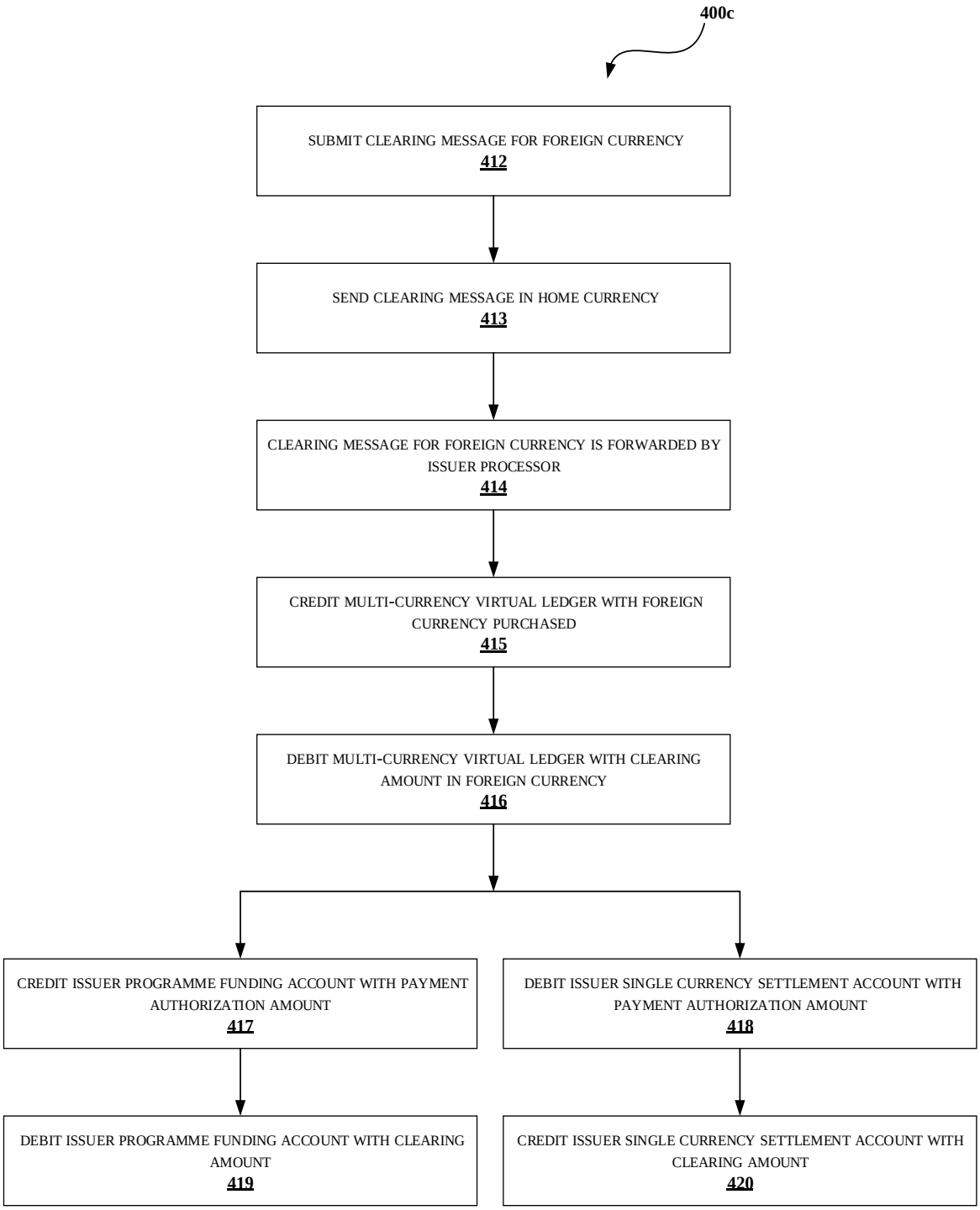
400c
SUBMIT CLEARING MESSAGE FOR FOREIGN CURRENCY
412
SEND CLEARING MESSAGE IN HOME CURRENCY
413
CLEARING MESSAGE FOR FOREIGN CURRENCY IS FORWARDED BY ISSUER PROCESSOR
414
CREDIT MULTI-CURRENCY VIRTUAL LEDGER WITH FOREIGN CURRENCY PURCHASED
415
DEBIT MULTI-CURRENCY VIRTUAL LEDGER WITH CLEARING AMOUNT IN FOREIGN CURRENCY
416
CREDIT ISSUER PROGRAMME FUNDING ACCOUNT WITH PAYMENT AUTHORIZATION AMOUNT
417
DEBIT ISSUER SINGLE CURRENCY SETTLEMENT ACCOUNT WITH PAYMENT AUTHORIZATION AMOUNT
418
DEBIT ISSUER PROGRAMME FUNDING ACCOUNT WITH CLEARING AMOUNT
419
CREDIT ISSUER SINGLE CURRENCY SETTLEMENT ACCOUNT WITH CLEARING AMOUNT
420

**Figure 4c**

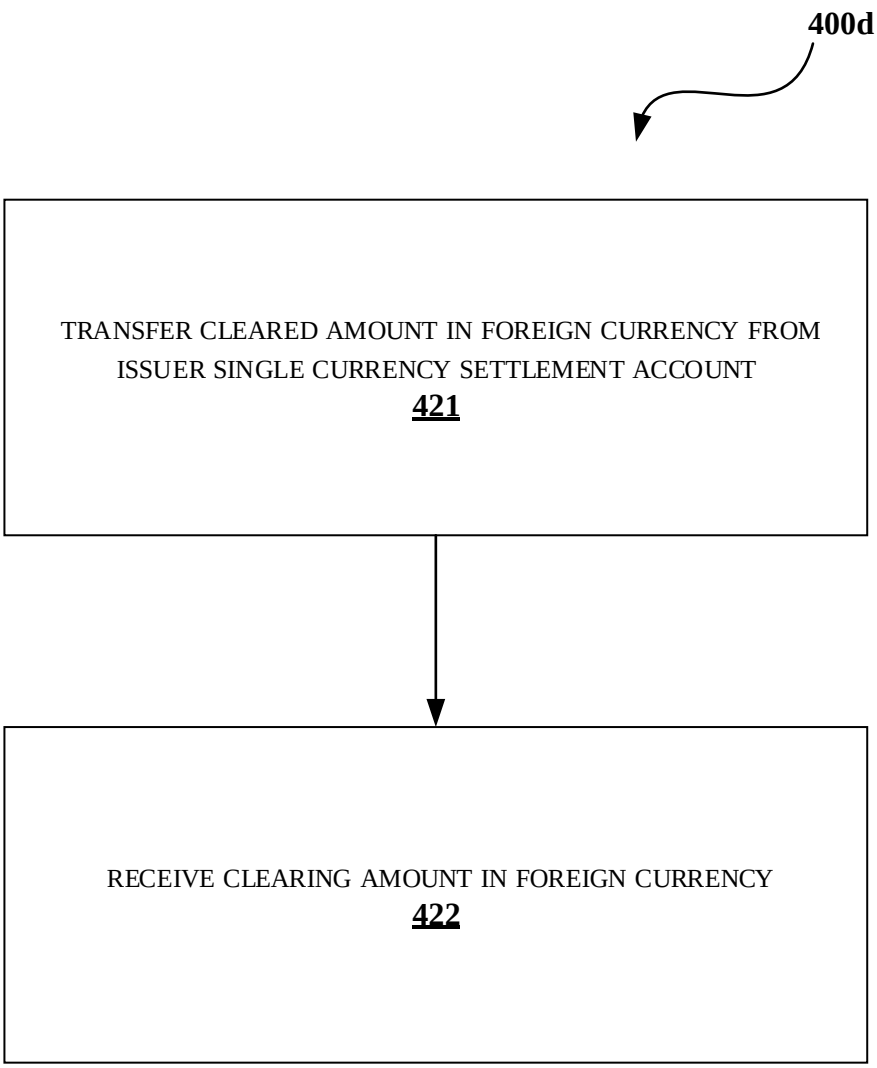
400d
TRANSFER CLEARED AMOUNT IN FOREIGN CURRENCY FROM ISSUER SINGLE CURRENCY SETTLEMENT ACCOUNT
421
RECEIVE CLEARING AMOUNT IN FOREIGN CURRENCY
422

**Figure 4d**

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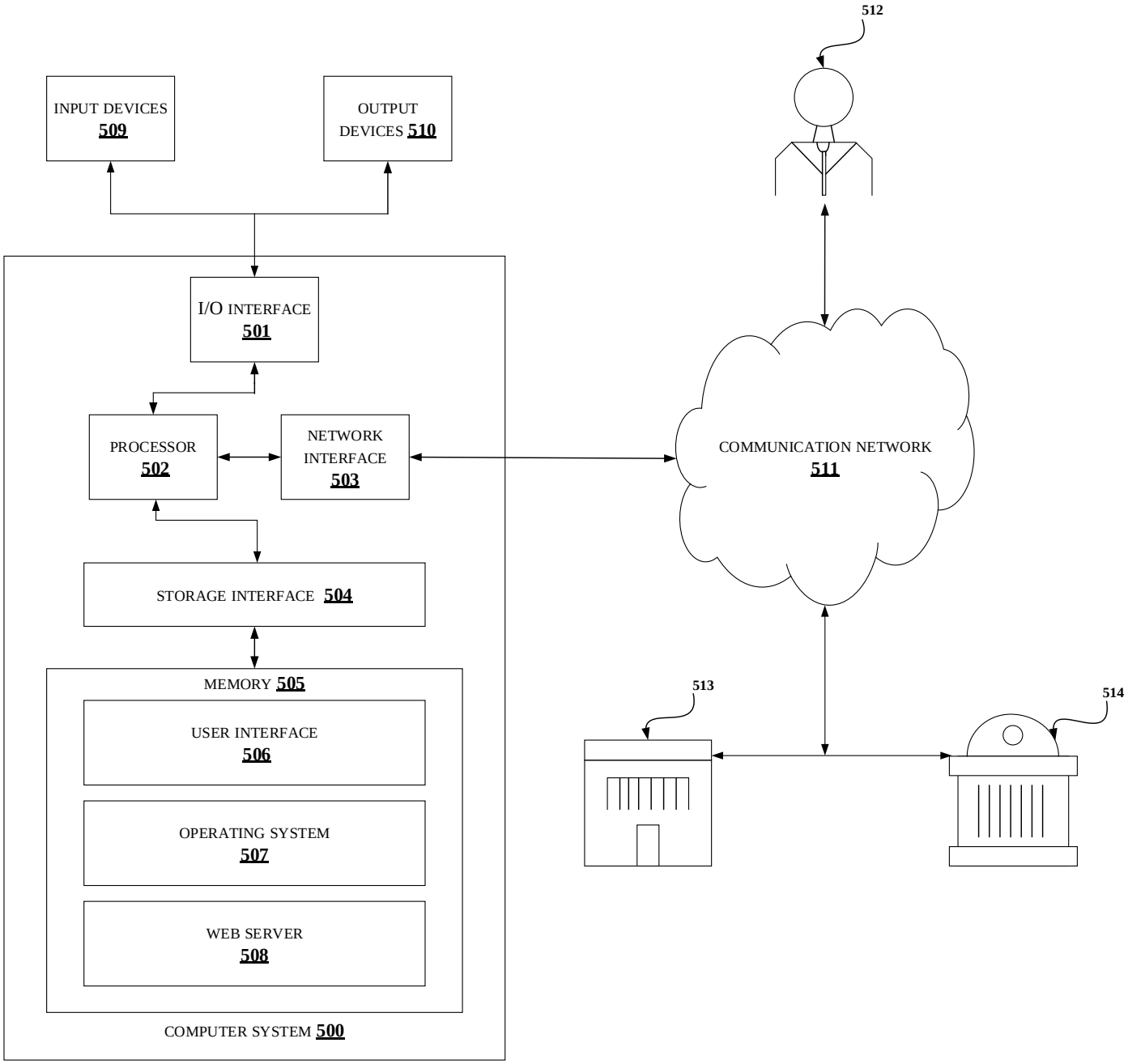


**Figure 5**