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A system and method for integrated cross-platform account management is provided. A method includes generating one or more repayment instructions which instruct repayment of at least part of a cash loan. Each instruction includes a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment. The method further includes initiating a transfer of funds from the one or more source accounts to a recovery account for a repayment amount equal to the sum of the one or more source amounts to effect repayment of at least part of the cash loan.

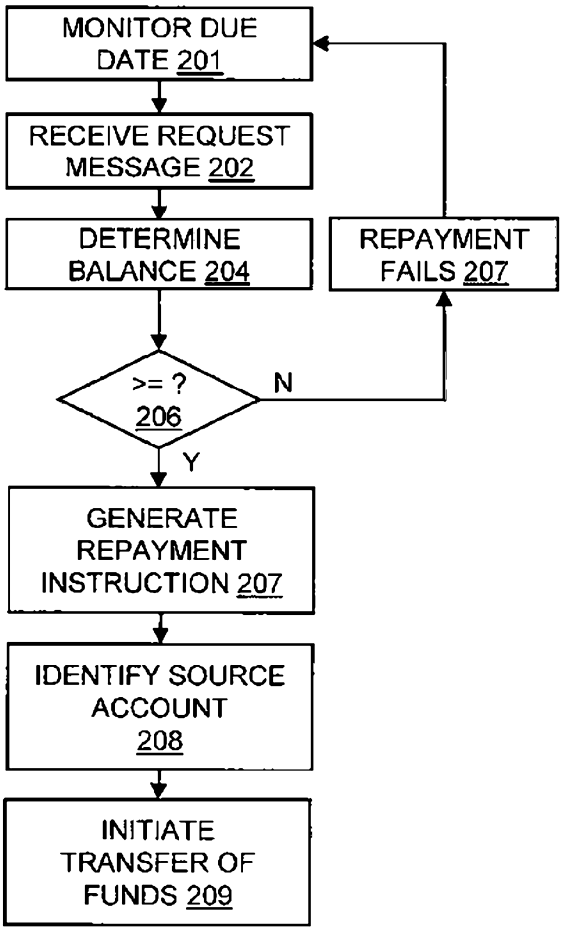

Fig. 3A

INTEGRATED CROSS-PLATFORM ACCOUNT MANAGEMENT

CROSS-REFERENCE(S) TO RELATED APPLICATIONS

This application claims priority from South African provisional patent application number 2021/01908 filed on 23 March 2021 and South African provisional patent application number 2021/04686 filed on 6 July 2021, both of which are incorporated by reference herein.

FIELD OF THE INVENTION

This invention relates to a system and method for integrated cross-platform account management. In particular, but not exclusively, the invention relates to a system and method for integrated cross-platform account management for mobile wallet cash loan repayment.

BACKGROUND TO THE INVENTION

Some mobile network operator (MNO) platforms include a mobile wallet (also termed "mobile money") platform for managing mobile wallets on behalf of subscribers and via which individual subscribers can store, transfer, borrow and withdraw money, pay beneficiaries and access other financial services. Increasingly, such mobile wallets have gained popularity, especially across emerging economies, for accessing digital credit or cash loans. These loans may be so-called "microloans", which are very small loans made to impoverished borrowers who typically lack collateral, steady employment, or a verifiable credit history. Loans accessed via a mobile wallet platform typically exhibit characteristics such as a maturity period, setup fee, interest, instalment and repayment methods.

There is however scope for improvement.

The preceding discussion of the background to the invention is intended only to facilitate an understanding of the present invention. It should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was part of the common general knowledge in the art as at the priority date of the application.

SUMMARY OF THE INVENTION

In accordance with an aspect of the invention there is provided a computer-implemented method comprising: generating one or more repayment instructions, wherein the or each repayment instruction instructs repayment of at least part of an outstanding amount associated with a cash loan, the or each repayment instruction including a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment; and, initiating a transfer of funds from the one or more source accounts to a recovery account for an amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount, including: if the one or more source accounts include the subscriber wallet account, initiating a transfer of funds from the subscriber wallet account to the recovery account, including interacting with the mobile wallet platform via a mobile wallet platform interface to adjust values of respective accounts maintained therein; and, if the one or more source accounts include the subscriber network usage account, initiating a transfer of funds from the subscriber network usage account to the recovery account, including interacting with the IN via an IN interface to adjust values of respective accounts maintained therein.

The method may include receiving a request message requesting repayment of at least part of the outstanding amount. The request message may include one or more repayment source indicators and either or both the one or more source amounts and a repayment amount. Generating the one or more repayment instructions may be in response to receiving the request message.

The request message may be received from a communication device of a subscriber associated with the cash loan via a subscriber channel of the mobile wallet platform.

The subscriber channel may provide access to the mobile wallet platform via SMS, IVR, USSD, software application or web channels.

The method may include monitoring for occurrence of a predefined condition. The predefined condition may include one or more of: loan repayment due date passed; and, inflow of funds detected at one of the one or more source accounts. The method may

include detecting occurrence of a predefined condition. Detecting occurrence of the predefined condition may trigger generating the one or more repayment instructions.

The number of repayment instructions generated and the source amount of the or each repayment instruction may be determined based on an available balance of one or both of the subscriber wallet account and the subscriber network usage account such that a sum of the one or more source amounts is less than or equal to the outstanding amount associated with the cash loan.

The method may include determining one or more of: an available balance of the one or more source accounts; the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, a repayment amount.

The method may further include determining, based on an available balance of one or more source accounts, one or more of: the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, a repayment amount.

Determining based on the available balance of one or more source accounts may include determining an inequality or equality of the available balance of one or more source accounts relative to the repayment amount or the outstanding amount.

The repayment amount may be determined such that the repayment amount is less than or equal to the outstanding amount. The source amount of the or each repayment instruction may be less than the available balance of the source account with which it is associated.

The method may include: determining whether a balance of a first source account is greater than or equal to the repayment amount; and, if the balance of the first source account of the one or more source accounts is greater than or equal to the repayment amount, generating a repayment instruction including a repayment source indicator indicating the first source account and including a source amount being equal to the repayment amount.

The method may include, if the balance of the first source account is less than the repayment amount, determining whether a balance of a second source account is greater

than or equal to the repayment amount; and, if the balance of the second source account is greater than or equal to the repayment amount, generating a repayment instruction including a repayment source indicator indicating the second source account and a source amount being equal to the repayment amount.

The method may further include if the balance of the second source account is less than the repayment amount: determining a second source amount which is less than the balance of the second source account; generating a repayment instruction including a repayment source indicator indicating the second source account and including the second source amount. The method may include: determining whether a difference between the repayment amount and the second source amount is less than the balance of the first source account; generating a repayment instruction including a repayment source indicator indicating the first source account and including a first source amount equal to the difference.

In accordance with a further aspect of the invention there is provided a system including a server computer comprising: a generating component for generating one or more repayment instructions, wherein the or each repayment instruction instructs repayment of at least part of an outstanding amount associated with a cash loan, the or each repayment instruction including a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment; an initiating component for initiating a transfer of funds from the one or more source accounts to a recovery account for an amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount, wherein the initiating component is configured: to initiate, if the one or more source accounts include the subscriber wallet account, a transfer of funds from the subscriber wallet account to the recovery account, and, to initiate, if the one or more source accounts include the subscriber network usage account, a transfer of funds from the subscriber network usage account to the recovery account, the initiating component including an interacting component which includes: a mobile wallet platform integration component configured to interact with the mobile wallet platform via a mobile wallet platform interface, an IN integration component configured to interact with the IN via an IN interface, and an adjustment component configured to adjust values of respective accounts maintained therein.

The system may include a mobile wallet platform configured to manage the wallet account on behalf of a subscriber and to provide functionality by way of which the subscriber can transact against the mobile wallet, including by storing, transferring and withdrawing money and paying beneficiaries.

The system may include a subscriber channel configured to provide access to the mobile wallet platform by a communication device via SMS, IVR, USSD, software application or web channels, wherein the mobile wallet platform is configured to transmit and receive data to and from the communication device via the subscriber channel and a mobile network.

The system may include an intelligent network (IN) and a charging system implemented as a node within the IN. The charging system may be implemented as or have access to a high-throughput database that maintains multiple network usage accounts for each subscriber.

The server computer may include a message receiving component configured to receive a request message requesting repayment of at least part of the outstanding amount. The request message may include one or more repayment source indicators and either or both the source amount and the repayment amount. The server computer may be configured to generate the one or more repayment instructions in response to receiving the request message.

The server computer may include a monitoring component configured to monitor for occurrence of a predefined condition. The predefined condition may include one or more of: loan repayment due date passed; and, inflow of funds detected at one or more source accounts. The server computer may include a detecting component configured to detect occurrence of a predefined condition. The server computer may be further configured to generate one or more repayment instructions in response to detecting occurrence of the predefined condition.

The server computer may include a determining component configured to determine one or more of: an available balance of the one or more source accounts; the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, the repayment amount.

The determining component may be configured to determine, based on the available balance of one or more source accounts, one or more of: the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, the repayment amount.

The determining component may be configured to determine an inequality or equality of the available balance of one or more source accounts relative to the repayment amount or the outstanding amount.

The determining component may be configured to determine the repayment amount such that the repayment amount is less than or equal to the outstanding amount, and, wherein the source amount of the or each repayment instruction is less than the available balance of the source account with which it is associated.

The server computer may be configured: to determine whether a balance of a first source account is greater than or equal to the repayment amount or the outstanding amount; and, if the balance of the first source account of the one or more source accounts is greater than or equal to the repayment amount or the outstanding amount, to generate a repayment instruction including a repayment source indicator indicating the first source account and including a source amount being equal to the repayment amount. The server computer may be configured, if the balance of the first source account is less than the repayment amount or the outstanding amount, to determine whether a balance of a second source account is greater than or equal to the repayment amount or the outstanding amount; and, if the balance of the second source account is greater than or equal to the repayment amount or the outstanding amount, to generate a repayment instruction including a repayment source indicator indicating the second source account and a source amount being equal to the repayment amount.

The server computer may be configured: if the balance of the second source account is less than the repayment amount or the outstanding amount: to determine a second source amount which is less than the balance of the second source account; and, to generate a repayment instruction including a repayment source indicator indicating the second source account and including the second source amount. The server computer may be configured: to determine whether a difference between the repayment amount or the outstanding amount and the second source amount is an amount less than the balance of the first

source account; and, to generate a repayment instruction including a repayment source indicator indicating the first source account and including a first source amount equal to the difference.

In accordance with a further aspect of the invention there is provided a computer program product comprising a computer-readable medium having stored computer-readable program code for performing the steps of: generating one or more repayment instructions, wherein the or each repayment instruction instructs repayment of at least part of an outstanding amount associated with a cash loan, the or each repayment instruction including a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment; and, initiating a transfer of funds from the one or more source accounts to a recovery account for an amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount, including: if the one or more source accounts include the subscriber wallet account, initiating a transfer of funds from the subscriber wallet account to the recovery account, including interacting with the mobile wallet platform via a mobile wallet platform interface to adjust values of respective accounts maintained therein; and, if the one or more source accounts include the subscriber network usage account, initiating a transfer of funds from the subscriber network usage account to the recovery account, including interacting with the IN via an IN interface to adjust values of respective accounts maintained therein.

Further features provide for the computer-readable medium to be a non-transitory computer-readable medium and for the computer-readable program code to be executable by a processing circuit.

In accordance with a further aspect of the invention there is provided a system comprising: a server computer configured to interface with a mobile wallet platform and an intelligent network (IN) of a mobile network operator (MNO), the server computer being configured to: receive a request message requesting repayment of at least part of a cash loan, wherein the request message includes a repayment amount and a repayment source indicator indicating a repayment source being one of a subscriber wallet account maintained by the mobile wallet platform or a subscriber network usage account maintained by the IN of the MNO; and, initiate a transfer of funds from the repayment source to a recovery account for the repayment amount to effect repayment of at least part of the cash loan.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Figure 1	is a schematic diagram which illustrates a loan lifecycle according to aspects of the present disclosure;
Figure 2	is a schematic diagram which illustrates an example system for integrated cross-platform account management according to aspects of the present disclosure;
Figures 3A to 3C	are flow diagrams which illustrate example methods for integrated cross-platform account management according to aspects of the present disclosure;
Figure 3D	is a swim-lane flow diagram which illustrates an example method for initiating a transfer of funds from a repayment source to a recovery account in an integrated cross-platform account management system according to aspects of the present disclosure;
Figure 4	is a schematic diagram which illustrates a user interface flow according to aspects of the present disclosure;
Figure 5	is a swim-lane flow diagram which illustrates example operations of a method for cash loan provisioning in an integrated cross-platform account management system according to aspects of the present disclosure;
Figure 6	is a swim-lane flow diagram which illustrates example operations of a method for loan repayment initiated by a subscriber in an integrated cross-platform account

management system according to aspects of the present disclosure;

Figure 7 is a swim-lane flow diagram which illustrates example operations of a method for time triggered payment process in an integrated cross-platform account management system according to aspects of the present disclosure;

Figure 8 is a swim-lane flow diagram which illustrates example operations of a method for lien triggered loan repayment in an integrated cross-platform account management system according to aspects of the present disclosure;

Figure 9 is a block diagram which illustrates exemplary components which may be provided by a system for integrated cross-platform account management according to aspects of the present disclosure; and,

Figure 10 illustrates an example of a computing device in which various aspects of the disclosure may be implemented.

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

Aspects of the present disclosure provide a system and method for integrated cross-platform account management. The integrated cross-platform account management system and method may be provided for cash loan repayment. In particular, aspects of the present disclosure provide for generating one or more repayment instructions. Each repayment instruction instructs repayment of at least part of an outstanding amount. The outstanding amount is the total amount owed by a subscriber for receiving a cash loan.

Each repayment instruction may include a repayment source indicator and a source amount. The repayment source indicator indicates a source account from which funds will be transferred for repayment of the or part of the outstanding amount. The source account for repayment may be a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO). The source amount is the amount to be withdrawn from the

source account. The repayment may be for a repayment amount, which may be set by a subscriber or a repayment plan, or which may be determined based on a sum of the one or more source amounts.

Generating repayment instructions may be in response to receiving a request message or in response to detecting a predefined condition. In some embodiments, the request message may include an indication of one or more of: an available balance of the one or more source accounts; the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, the repayment amount. In other embodiments the aforementioned parameters may need to be determined. Determining may for example include analysing the available balances of one or more source accounts and determining the aforementioned based on the available balances.

Repayment instructions may cause funds to be transferred from the one or more source accounts to a recovery account for the repayment amount to effect repayment of at least part of the outstanding amount.

If the one or more source accounts include the subscriber wallet account, initiating a transfer of funds from the subscriber wallet account to the recovery account may include interacting with the mobile wallet platform via a mobile wallet platform interface to adjust values of respective accounts maintained therein. If the one or more source accounts include the subscriber network usage account, initiating a transfer of funds from the subscriber network usage account to the recovery account, may include interacting with the IN via an IN interface to adjust values of respective accounts maintained therein.

Aspects of the present disclosure therefore may provide the infrastructure for integrated cross-platform account management for using mobile airtime for the repayment of an outstanding mobile wallet cash loan amount. This may offer more flexibility to the loan recipients and may enable them to avoid additional fees/penalties by paying the outstanding amount on time. In an example implementation, a subscriber will access the cash loan service from the mobile money service menu accessible to the subscriber via his or her communication device. The subscriber can apply for a cash loan digitally via the cash loan service. Upon the approval of the cash loan application, the cash equivalent of the approved loan amount will be disbursed into the mobile wallet of the subscriber (or otherwise paid out to the subscriber). The subscriber will be informed about the available

repayment methods, which may, according to aspects of the present disclosure, include a "Repayment via Airtime" option. As illustrated in Figure 1, the lifecycle of a cash loan product is typically divided into two main phases: maturity phase (3); and collection phase (5)

The date on which the loan was taken is referred to as a loan date (7), and it is considered as the 0-day (day zero) of the loan. The last date of the maturity phase is termed the loan repayment due date (9) and marks the date when the subscriber should fully repay the loan. The proposed service may accept partial payments. Figure 1 is further described by Table 1 below:

Table 1: Loan repayment phases

Phase	Period	Description
Maturity (3)	Period by which the subscriber agrees to repay the loan	This is the loan phase in which the full loan repayment is not expected, and the end of the phase marks the date when full repayment of the loan is expected.
Collection (5)	Period between the end of the maturity phase until repayment	This is the loan phase that follows the maturity phase and lasts until the loan is fully repaid. During collection phase the subscriber will be notified of the outstanding amount regularly.

An example system for loan provisioning and repayment is illustrated in Figure 2. The system (100) may include a service provider platform (102), a mobile wallet platform (112) and a mobile network operator (MNO) platform (104).

The service provider platform (102) may be provided by a third-party service provider which provides services to the MNO and its subscribers. In other implementations, the functionality of the service provider platform may be incorporated into the MNO platform. The MNO platform (104) may be provided by a mobile network operator (MNO) which provides access to a mobile network (110) by mobile subscribers. The system (100) may further include communication devices (106), such as mobile handsets, associated with mobile subscribers who subscribe to the MNO and make use of the mobile network (110) to make and receive calls, send and receive SMS messages, transmit and receive data packets (e.g. for Internet browsing, etc.) and the like.

The MNO platform (104) and mobile network (110) may collectively provide the infrastructure by which communication devices (106) can communicate with each other and the broader public switched telephone network (PSTN) and the Internet. The mobile network (110) may for example include one or more base station subsystems while the MNO platform (104) may provide back-end systems such as a USSD/GPRS gateway, SMSC and associated components (VLR, HLR, etc.).

The MNO platform (104) may include a prepaid gateway (113), an intelligent network (IN) (114) and a charging system (116). In some embodiments, the MNO platform (104) may include or maintain the mobile wallet platform (112). In other embodiments, the mobile wallet platform (112) may be independent of the MNO platform (104).

The mobile wallet platform (112) may be configured to manage mobile wallets (112C) on behalf of subscribers and provide functionality by which individual subscribers can transact against their wallets, for example by storing, transferring and withdrawing money, paying merchants, utility providers and other beneficiaries and optionally use and access other financial services such as requesting and repaying cash loans.

The mobile wallet platform (112) may include a subscriber channel (112A) via which the mobile wallet platform interfaces with the mobile network (110) and in turn the communication devices (106) of individual subscribers. The subscriber channel (112A) may provide access to the mobile wallet platform (112) via SMS, IVR, USSD, software application or web channels. The mobile wallet platform (112) may transmit and receive data, instructions and/or messages to and from the respective communication devices (106) via the subscriber channel (112A) and the mobile network (110). The mobile wallet platform (112) may for example be configured to receive requests and/or instructions from the communication devices (106) via the subscriber channel (112A) and to transmit offers and/or notifications to the communication devices (106) via the subscriber channel (112A).

The mobile wallet platform (112) may have access to and/or maintain a wallet database (112B) in which individual mobile wallets (112C) (which may also be termed "wallet accounts") are stored. Each mobile wallet (112C) may be associated with a subscriber identifier and may store balance and/or transaction information. Each mobile wallet (112C) may be configured for transacting against by its associated subscriber via the subscriber channel (112A), so as to enable the mobile wallet platform functionality. In some

implementations, each mobile wallet (112C) includes or is associated with a loan account against which cash loans and their associated outstanding balance information may be recorded. The mobile wallet platform (112) may include a lien component (112D) configured to record and monitor liens against individual wallet accounts associated with subscriber identifiers. The lien component (112D) may be configured to redirect an inflow of funds to a mobile wallet (112C) against which a lien is recorded towards partial or full recovery of an outstanding amount associated with the subscriber identifier. The outstanding amount may for example be stored in a loan account maintained by the mobile wallet platform (112) and associated with the subscriber identifier.

The prepaid gateway (113) may be configured, amongst other things, to detect requested usage of the mobile network (110) by a subscriber associated with a subscriber identifier, to capture information associated with the requested usage, such as the subscriber identifier, to transmit the captured information to the charging system (116), to receive permitted usage information from the charging system (116), to permit and monitor usage of the mobile network in accordance with the permitted usage information and/or to report actual usage information to the charging system (116).

The IN (114), which may also be termed a "Telco IN," may be implemented according to any suitable network architecture (e.g. that specified in the ITU-T Q.1200 series recommendations, or the like). The IN (114) may allow the MNO to provide various value-added services, such as network usage advance services, in addition to the standard telecom services such as PSTN, GSM, etc. The IN (114) may include one or more network nodes on the service layer, distinct from the switching layer of the core network, as opposed to solutions based on intelligence in the core switches or equipment. The IN may be supported by the Signalling System #7 (SS7) protocol between network switching centres and other network nodes owned by network operators.

The charging system (116) may be implemented as a node within the IN (114) that is responsible for collecting data on service usage and to generate reports thereon for billing, either on demand or automatically. In some implementations, the charging system may be an online charging system (OCS). The charging system (116) may be configured to authenticate and authorize network usage requests associated with subscriber identifiers received from the prepaid gateway (113), determine and transmit permitted usage information (such as a maximum call duration, etc.) to the prepaid gateway and to receive and charge the subscriber in accordance with actual usage information from the prepaid

gateway (113). The charging system (116) may be implemented as or have access to a high-throughput database that maintains multiple network usage accounts for each subscriber. The purpose, type and usage of the network usage accounts may be defined by the MNO, in some cases upon request by the service provider.

The network usage accounts may include one or more of: a main account, a dedicated account, a loan tracking account (also referred to as a principal tracking account), a fee tracking account and a lien. These accounts may be airtime accounts in that their value is denominated in airtime (which is typically equivalent to a value of currency, such as ZAR, USD, NGN, etc.). The network usage accounts may further include one or more data bundle, SMS bundle and voice minute bundle accounts which accounts may for example have their values denominated in bytes, a number of SMS messages and a number of minutes and seconds, respectively.

Airtime top-ups, recharges or purchases may be provisioned to the main account and usage of the mobile network (110) (such as making phone calls, sending SMS messages, transmitting and receiving data packets) by the subscriber may typically be charged against the main account. Network usage advances (such as airtime advances) may be provisioned to the main account or the dedicated account. Once the network usage advance has been provisioned, further use of the mobile network (110) may be charged against the account to which the network usage advance was provisioned until the balance thereof has been depleted.

Data bundles purchased by the subscriber may be provisioned to a main data bundle account after which the transmission and reception of data packets by the subscriber's communication device (106) via the mobile network (110) may be recorded (or deducted from) the main data bundle account. Data bundle advances may be provisioned either to the main data bundle account or, in some implementations, to a dedicated data bundle account. Once provisioned, further transmission/reception of data packets may be recorded against the main data bundle account or the dedicated data bundle account, as the case may be, until the balance thereof has been depleted to zero. The same may apply, *mutatis mutandis*, for the SMS and voice minute bundle accounts.

The network usage accounts described herein may be implemented as fields of a high-throughput database. The fields may be associated with a subscriber identifier and can be updated or modified in real-time in response to network usage or top-up events. Different

fields of the database may represent different network usage accounts associated with a particular subscriber.

In some implementations, the charging system (116) may include or be embodied by a data structure, such as a table maintained by relational database management system (RDBMS), having rows which are associated with subscribers (identified by way of a subscriber identifier, such as an MSISDN or other suitable identifier) and columns which are associated with network usage account identifiers which identify and correspond to different types of network usage accounts, such as each of the respective network usage accounts described in the foregoing.

The system (100) may include a provisioning and recovery node (120), which may be provided by a node of the IN (114). The provisioning and recovery node (120) may be configured to provision network usage products to appropriate network usage accounts of subscribers pursuant to associated events, such as network usage product purchases, network usage product advances, top-up events and the like. The provisioning and recovery node (120) may be configured to manipulate or adjust (e.g. access, change and/or update) fields of the charging system (116) so as to effect the provisioning of airtime and/or mobile bundles or the recovery of loans. In some implementations, the provisioning and recovery node (120) may be configured to query a lien associated with the subscriber identifier upon a subscriber top-up event or other inflow of funds and to divert some or all of the amount associated with the top-up or inflow to a recovery account in order to effect partial or complete recovery of the outstanding amount represented by the lien.

The system (100) may include one or more front-end APIs (126) by which the service provider platform (102) may interface with mobile wallet platform (112) and/or components or nodes of the MNO platform (104) such as the intelligent network (114), the charging system (116), the provisioning and recovery node (120) and the like. The front-end API (126) may interface with or provide access to an IN-integration component for aspects of the interface.

The service provider platform (102) may be provided by any suitable computing device or devices and may for example include a server computer (121). The server computer (121) may be configured to interface and/or integrate with the MNO platform (104); for example the server computer (121) may be configured to interface and/or integrate with the intelligent network (114) and/or the charging system (116) via an appropriate front-end API

(126), an appropriate IN integration component or the like. The server computer (121) may be configured to interface with the mobile wallet platform (112). For example, the server computer (121) may be able to transact against mobile wallets (112C) maintained by the mobile wallet platform (112) and adjust account balances of network usage accounts stored in the charging system (116).

The server computer (121) may utilise IN integration for: receiving MNO (or 'telco') related subscriber data; setting/updating/removing liens against accounts maintained by the IN (or 'telco accounts'); and, receiving loan payments. The server computer (121) may utilise mobile wallet platform integration for: receiving mobile wallet related subscriber data; crediting loan amounts (disbursed into subscriber wallet); setting/updating/removing a lien against a mobile wallet; and, receiving loan payments.

The server computer (121) may have access to a subscriber database (122) in which a record (124) associated with each subscriber is stored. Each subscriber record (124) may include and be associated with a subscriber identifier. In some implementations, each subscriber record (124) includes one or more sets of credit data, such as a credit score, an outstanding network usage advance status, a network usage advance eligibility, a total credit limit and the like. The credit score may be an indication of credit worthiness, or an indication of the risk associated with the subscriber. A high credit score may indicate low risk while a low credit score may indicate a high-risk subscriber. The total credit limit may be a total credit limit value denominated in a value of airtime. The credit limit value represents a value of a network usage advance for which a subscriber associated with the subscriber identifier is eligible in advance of payment. Each subscriber record (124) may also include information relating to outstanding loans (e.g. outstanding cash loans), such as due dates, amounts outstanding, information relating to liens and the like.

The server computer (121) may be configured to perform credit scoring and risk management operations using data received from the MNO platform and/or other sources and to maintain and update credit data and/or risk data stored in subscriber records accordingly. For credit scoring and risk management, the server computer (121) may for example be configured to utilize/process available MNO and mobile wallet service data available from the mobile money service provider.

The system (100) described above may implement a method for loan provisioning and repayment. An exemplary method for loan repayment is illustrated in the flow diagrams of

Figures 3A to 3C. The method may be conducted by one or more computing devices, such as one or more server computers forming part of a service provider platform, MNO platform, mobile wallet platform or the like.

Starting with Figure 3A, the method may include monitoring (201) for occurrence of one or more predefined conditions, such as a loan repayment due date (9), associated with a cash loan. The loan repayment due date may only be monitored while the loan is outstanding.

At some stage after the loan date (7) and typically before the due date (9), the method may include receiving (202) a request message requesting repayment of at least part of a cash loan recorded against a loan account. The request message may be associated with a subscriber identifier associated with a subscriber. The request message may include the subscriber identifier, or the request message may be received from a communication device associated with the subscriber identifier. The request message may be received from a communication device of a subscriber associated with a cash loan via a subscriber channel of the mobile wallet platform. The communication device, and hence the subscriber, may be identifiable via the communication channel via which the request message is received. The loan account may be maintained by the mobile wallet platform (112) and may for example be a sub-account of the subscriber's mobile wallet (112C). The subscriber channel may provide access to the mobile wallet platform via SMS, IVR, USSD, software application or web channels.

The request message requests repayment of at least part of the outstanding amount. The request message may include a repayment amount and a repayment source indicator. The repayment amount indicates the amount to be repaid (which may be equal to or less than an outstanding amount associated with the loan). The repayment source indicator indicates a repayment source, which may be one of a subscriber wallet account (i.e. the subscriber's mobile wallet (112C)) maintained by the mobile wallet platform, or a subscriber network usage account maintained by the IN or the charging system of the MNO. The subscriber network usage account may be an airtime account or a mobile bundle account associated with the subscriber identifier. The subscriber network usage account may be maintained by an intelligent network (IN) forming part of a mobile telephone network. The request message may be comprised of one or more separate messages which together constitute a request message.

In some embodiments, the method may include generating one or more repayment

instructions in response to receiving a request message. This may include determining a source amount from the repayment amount and an available balance of the source account (e.g. checking to see if the balance of the source account is greater than or equal to the repayment account such that the repayment can be funded from the source account).

In some embodiments, the request message may not include the repayment amount and/or repayment source indicator. The method may for example include determining one or more of: an available balance of the one or more source accounts; the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; an available balance of the one or more source accounts, and the repayment amount. Determining may take into account or be based on the available balance of one or more source accounts. Determining based on the available balance of one or more repayment sources may include determining an inequality or equality of the available balance of one or more source accounts relative to the repayment amount or the outstanding amount. For example, the method may include determining (204) whether the balance of the source account is greater than or equal to the desired repayment amount. This may include querying the status of the subscriber wallet account or subscriber network usage account via a mobile wallet platform interface or intelligent network interface, as the case may be.

If (206) the source account has a balance which is greater than or equal to the repayment amount, the method may include generating (207) a repayment instruction indicating a source amount equal to the repayment amount, and associated a repayment source indicator indicating the source account.

The method may include identifying from the repayment instruction the repayment source indicator and determining the source account for repayment (208). In embodiments where more than one repayment instruction was generated, the method may include identifying the one or more repayment source indicators and determining the one or more source accounts for repayment. Identifying the repayment source indicator and determining the source account may be used for routing to the appropriate interface for initiating the transfer of funds.

The method may include initiating (209) a transfer of funds from the repayment source to a recovery account for the repayment amount to effect repayment of at least part of the

loan according to the repayment instruction or instructions. This may include adjusting the balance of the repayment source and the recovery account to reflect the transfer of funds. This may include interacting with a first source account and/or a second source account, as the case may be, via a mobile wallet platform interface or intelligent network interface, as the case may be. Otherwise (206), the repayment may fail (207), and the subscriber may be notified accordingly.

In the method described above, the request message may be received from a mobile communication device associated with the subscriber identifier. The subscriber may initiate full or partial repayment by accessing a user interface on his/her communication device. In such a "user initiated repayment," the subscriber may choose between their mobile wallet account, network usage (e.g. airtime) account and other available methods for repaying the outstanding loan amount. Once the repayment source is selected, the subscriber may select whether he/she wants to repay the full outstanding amount or any amount (partial payment). In a case where the subscriber attempts paying the outstanding amount using airtime, the system may check availability of an equivalent airtime amount in the network usage account (or telco main account) within the IN, and accordingly process the transaction. In case of insufficient airtime or network usage balance in the network usage account, the transaction will be unsuccessful, and the subscriber may be notified accordingly. An example user interface flow for subscriber-initiated repayment is illustrated in Figure 4. In other implementations, the subscriber may input only the repayment amount and the method may dynamically determine one or more source amounts from one or more available source accounts and generate one or more repayment instructions based on the determination.

In other scenarios, referring now to Figure 3B, the repayment instruction may be auto-generated in response to the method monitoring (201) for and detecting (221) occurrence of one or more predefined conditions. The predefined conditions may include one or more of: loan repayment due date passed (9); and, inflow of funds detected at first or second account for which lien has been applied after loan repayment due date (9).

Upon detecting (221) passing of the loan repayment due date (9) (or expiry of the maturity phase (3)), the method may include determining (222) an outstanding value associated with the loan. This may include querying a loan account associated with the subscriber identifier maintained by the mobile wallet platform to determine the outstanding value associated with the loan.

In some embodiments, the method may include determining one or more of: an available balance of the one or more source accounts; the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; an available balance of the one or more source accounts, and the repayment amount as previously described. Determining may take into account or be based on the available balance of one or more source accounts. Determining based on the available balance of one or more repayment sources may include determining an inequality or equality of the available balance of one or more source accounts relative to the repayment amount or the outstanding amount.

For example, the method may include determining (226) whether the balance of a first source account is greater than or equal to the repayment amount. The repayment amount may be determined such that the repayment amount is less than or equal to the outstanding amount.

If (228) the balance of the first source account is greater than or equal to the balance of the repayment amount, the method may include generating (229) a repayment instruction including a repayment source indicator indicating the first source account and including a source amount being the repayment amount. The method may further include initiating (230) the transfer of funds from the first source account to a recovery account for the repayment amount.

If (228) the balance of the first source account is less than the repayment amount, the method may include determining (236) whether the balance of a second source account is greater than or equal to the repayment amount.

If (238) the balance of the second source account is greater than or equal to the repayment amount, the method may include generating (239) a repayment instruction including a repayment source indicator indicating the second source account and including a source amount being the repayment amount. The method may further include initiating (240) a transfer of funds from the second source account to a recovery account for a second source amount equal to the repayment amount.

In other words, the method may first try to obtain recovery from the subscriber wallet

account and then, if that fails, from the subscriber network usage account, or vice versa. . The source amount of the or each repayment instruction may be less than the available balance of the source account with which it is associated.

In some implementations, if (238) the balance of the second source account is less than the repayment amount, the repayment may fail (242). Repayment failing may be the full repayment of the repayment amount failing.

If (238) the balance of the second source account is less than the repayment amount, the method may include initiating partial repayment (243) of the repayment amount. Initiating partial repayment may include generating one or more payment instructions and initiating a transfer of funds for the amount or amounts of one or both of the balance of the first account or second account if either or both have a positive value to as to effect recovery. Each repayment instruction may for example include a source amount which is equal to or less than an available balance of an associated source account and a repayment source indicator indicating the source account as the repayment source. The source account may be one of a subscriber wallet account maintained by the mobile wallet platform or a subscriber network usage account maintained by the IN or the charging system of the MNO.

Effecting recovery may therefore include initiating (244) a transfer of funds from the subscriber network usage account maintained by the IN of the MNO for a value equal to the positive balance (if any) of the subscriber network usage account; and initiating (246) a transfer of funds from the subscriber wallet account maintained by the mobile wallet platform for a value equal to the positive balance (if any) of the subscriber wallet account. In other words, the available balance of each of the subscriber wallet account and the subscriber network usage account may be used for recovery of the outstanding value of the loan.

In some embodiments, if the balance of the second source account is less than the repayment amount, the method may include determining an updated second source amount which is less than the balance of the second source account, and, if the difference between the repayment amount and the updated second source amount is an amount less than the balance of the first source account, generating a repayment instruction including

an updated first source amount equal to the difference and initiating a transfer of funds from the first source account to a recovery account for the updated first source amount. In this way partial payment from multiple accounts may be effected.

In other words, the method may include effecting repayment from a first source account, and if unable to do so, effecting repayment from a second source account. If repayment cannot be effected from the second source account, the method may include effecting partial repayment from either or both the first and second accounts. If repayment is to be effected from both accounts, the server computer (121) may be configured to determine the source amounts such that the repayment amount is less than or equal to the outstanding amount and each source amount is less than or equal to the available balance of the respective source accounts. The first source account may be a network usage account, and the second source account may be a wallet account, or vice versa.

In some embodiments, the auto-generation of payment instructions described in the foregoing may be termed "auto-debit." Upon maturity, a mobile wallet of the subscriber may be auto-debited for recovering the outstanding installment amount. In case of failure, a telco main account (network usage or airtime account) will be auto-debited to recover the outstanding loan amount using the equivalent airtime value. Transaction status (successful / unsuccessful) may be communicated to the subscriber. The balances within the respective accounts after an exemplary transactional scenario are shown in Table 2 below.

Table 2: Exemplary account balances after transactions

Event	**Wallet**	**Main Account**	**Outstanding**
Initial state	0	20	0
Subscriber requests for Cash loan of $10 with $1 fee. Loan disbursed into the Mobile Wallet	10	20	11
Subscriber consumes the loan amount, and installment payment $2 is due			
Auto-debit of instalment amount $2	0	20 – 2 = 18	11 – 2 = 9

Referring now to Figure 3C, if the repayment fails (242), the method may include setting (250) a lien against one or both of the subscriber wallet account and the subscriber network usage account associated with the subscriber identifier. The method may include detecting (252) an inflow of funds into one or both of the subscriber wallet account and the subscriber network usage account. In response to detecting the inflow of funds, the method may include generating (254) one or more repayment instructions, each of which instructs repayment of at least part of the loan. Each request message includes a repayment amount which is equal to the balance of the subscriber wallet account or the subscriber network usage account, as the case may be, and a repayment source indicator indicating either the subscriber wallet account or subscriber network usage account as the source account for the repayment.

The method includes method includes initiating (256) a transfer of funds from the one or more repayment sources to a recovery account for the one or more repayment amounts to effect repayment of at least part of the loan. This may include adjusting the balance of the repayment source and the recovery account to reflect the transfer of funds.

If full repayment is effected, the liens may be removed from the first account and/or second account.

A lien on each account (for example the subscriber wallet account or subscriber network usage account) could be implemented in the following way: the Telco IN/Mobile Money platform may hold the value of the outstanding balance (the value may be set/cleared/updated by service provider platform). Based on this value, the Telco IN/Mobile Money platform may proceed with the collection whenever new airtime/cash is credited by the subscriber to the Telco IN/Mobile Money platform. Or, the Telco IN/Mobile Money platform may notify in real time the service provider platform for new airtime/cash. Based on this notification and its private ledger, the service provider platform may trigger a debit operation toward the Telco IN/Mobile Money platform to recover partially or fully the outstanding amount.

Thus, should a subscriber fail to repay the outstanding amount by maturity, a lien may be applied to both accounts. When a repayment is received, the lien may be updated, if it is a partial repayment or the lien may be removed, if it is a full repayment.

The recovery account referred to herein may be a service provider wallet account maintained by the mobile wallet platform or a service provider network usage account maintained by the IN of the MNO. Referring now to Figure 3D, initiating the transfer of funds from the repayment source to the recovery account may include interacting with one or both of the mobile wallet platform and the IN to adjust values of respective accounts maintained therein.

Initiating the transfer of funds may include the server computer (121) determining (302) whether the repayment source is an account maintained by the IN (114) or the mobile wallet platform (112) or the like. This may include the server computer (121) parsing or otherwise evaluating the repayment source indicator included in the request message to determine if the repayment source is an account maintained by the IN, the mobile wallet platform or the like.

If (304) the repayment source is an account maintained by the IN, the server computer may interact (306) with the IN via the IN interface (126A) and adjust or cause adjustment of values of the subscriber network usage account (114A) and the service provider network usage account (114B) in order to effect the transfer of funds. This may include using the subscriber identifier (and/or a subscriber network usage account identifier) and a service provider identifier (and/or a service provider network usage account identifier) to adjust the values of the appropriate accounts. The server computer (121) may then receive (307) a response from the IN via the IN interface (126A). If successful, the response may confirm the adjustment of the values. If unsuccessful, the response may be a notification of failure or other error message.

Initiating the transfer of funds from the repayment source to the recovery account may therefore include initiating a transfer of funds from the repayment source to a service provider network usage account if the repayment source is the subscriber network usage account.

If (304) the repayment source is an account maintained by the mobile wallet platform, the server computer may interact (308) with the wallet database via the mobile wallet platform interface (126B) and adjust or cause adjustment of the values of the subscriber wallet account (112C) (or subscriber mobile wallet) and the service provider wallet account (112D) in order to effect the transfer of funds. This may include using the subscriber identifier (and/or a subscriber wallet account identifier) and a service provider identifier (and/or a

service provider wallet account identifier) to adjust the values of the appropriate accounts. If successful, the server computer (121) may then receive (309) a response from the mobile wallet platform via the mobile wallet platform interface (126B) confirming adjustment of the values. If unsuccessful, the response may be a notification of failure or other error message.

Initiating the transfer of funds from the repayment source to the recovery account may therefore include initiating a transfer of funds from the repayment source to a service provider wallet account if the repayment source is the subscriber wallet account.

In some implementations, initiating the transfer of funds from the repayment source to the recovery account may include initiating a transfer of funds from the repayment source to a service provider wallet account if the repayment source is the subscriber network usage account. In such a case, the transfer may include interacting with the IN to adjust values of the subscriber network usage account and an intermediate network usage account and then interacting with the mobile wallet platform to adjust values of an intermediate wallet account the service provider wallet account. In some cases the intermediate accounts may be dispensed with.

Tables 3 and 4 show example balance adjustments of a subscriber's mobile wallet and network usage accounts for provisioning and recovery of a cash loan according to aspects of the present disclosure.

Table 3: An example of loan provisioning

EVENT	SUBSCRIBER				SERVICE PROVIDER		
	Mobile Money		Telco IN			Telco IN	Mobile Money
	Wallet	Lien	Main Account	Lien	Outstanding	Account	Wallet
Initial state	0	0	0	0	0	0	100
Subscriber requests for Cash loan of	10	0	0	0	11	0	100-10 = 90

$10 with $1 fee. Loan disbursed into the Mobile Wallet							
Subscriber consumes the loan amount and fails to repay loan by maturity / due date; LIEN applied to both accounts							
Subscriber Accounts with LIEN applied	0	11	0	11	11	0	90

Table 4: Exemplary recovery by lien-triggered loan repayment from both the subscriber's airtime and wallet accounts

EVENT	SUBSCRIBER					SERVICE PROVIDER	
	Mobile Money		Telco IN		Outstanding	Telco IN	Mobile Money
	Wallet	Lien	Main Account	Lien		Account	Wallet
Subscriber accounts with LIEN applied	0	11	0	11	11	0	90

Subscriber recharges his mobile airtime with $5 (partial repayment)	0	11-5 = 6	0	11 - 5 = 6	11 - 5 = 6	0+5=5	90
Subscriber add $50 to Mobile Wallet (fully recovered)	0 + 50 - 6 = 44	6-6 = 0	0	6 - 6 = 0	6 - 6 = 0	5	90+6 = 96
Final balances	44	0	0	0	0	101	

In any of the aforementioned embodiments, the method may include identifying the one or more source accounts for repayment from the repayment source indicator or indicators in order to initiate a transfer of funds from the one or more source accounts.

Figures 5 to 8 are swim-lane flow diagrams which illustrate the methods described above in greater detail.

Figure 5 illustrates an exemplary method for loan provisioning. The subscriber may firstly use a communication device (106) to request a cash loan from the service provider's server computer (121), and the server computer (121) may then run eligibility checks. If the subscriber is found to be eligible, the server computer (121) may then credit the loan amount to the subscriber's wallet (112C), and the mobile wallet platform (112) may send a response to the server computer (121). If the cash loan is outstanding after the maturity date of the loan, the server computer (121) may set the outstanding amount flag or value in the wallet platform (112), and the wallet platform (112) may return a response. The server computer (121) may also set the outstanding amount flag or value in the IN (114), after which the IN (114) may send a response to the server (121).

Figures 6 to 8 illustrate example operations of methods for loan repayment. Figure 6 illustrates an example method where repayment is initiated by the subscriber; Figure 7

illustrates a time triggered payment process; and Figure 8 illustrates lien triggered loan repayment.

In Figure 6, the subscriber may use a communication device (106) to request full or partial payment of a loan from the service provider's server computer (121). The server computer (121) may then debit the amount from the subscriber's mobile wallet (112C), and the wallet platform (112) may send a response to the server computer (121). If the payment is after the maturity date, the server computer (121) may update the outstanding amount flag or value in the mobile money wallet platform (112), and the wallet platform (112) may send a response to the server computer (121). The server computer (121) may also update the outstanding amount flag or value in the IN (114), after which the IN (114) may send a response to the server computer (121).

In Figure 7, the server computer (121) may firstly debit the amount from the mobile money wallet (112C), and the wallet platform (112) may send a response. If the payment is after the maturity date, the server computer (121) may update the outstanding amount flag or value in the mobile money wallet platform (112), and the wallet platform (112) may send a response to the server computer (121). The server computer (121) may also set the outstanding amount flag or value in the IN (114), after which the IN (114) may send a response to the server computer (121). The server computer (121) may then send a notification of the payment process outcome to the subscriber's communication device (106).

In Figure 8, the subscriber may use a communication device (106) either to deposit cash into the mobile money wallet (112C) or to recharge the IN (114) account. If the subscriber deposits cash into the mobile money wallet (112C), the wallet platform (112) may notify the service provider's server computer (121) that new money has landed in the account (112C), and the server computer (121) may debit the amount from the wallet (112C) (the lien triggered loan payment). The wallet platform (112) may then send a response to the server computer (121). Alternatively, if the subscriber recharges the IN (114) account, the IN (114) may notify the server computer (121) that new money has landed in the account, and the server computer (121) may debit the amount from the IN (114) account (the lien triggered loan payment). The IN (114) account may then send a response to the server computer (121). After the response is sent from either the mobile money wallet platform (112) or the IN (114), the server computer (121) may update the outstanding amount flag or value in both the mobile money wallet platform (112) and the IN (114), and the wallet platform (112)

and the IN (114) may send responses to the server computer (121). The server (121) may then send a notification of the outcome of the lien triggered payment to the subscriber's communication device (106).

Figure 9 is a block diagram which illustrates exemplary components which may be provided by a system for integrated cross-platform account management according to aspects of the present disclosure. The system includes a server computer (121), which may form part of a service provider platform, a mobile wallet platform or an MNO platform, depending on the implementation.

The server computer (121) may include a processor (901) for executing the functions of components described below, which may be provided by hardware or by software units executing on the server computer (121). The software units may be stored in a memory component (902) and instructions may be provided to the processor (901) to carry out the functionality of the described components. In some cases, for example in a cloud computing implementation, software units arranged to manage and/or process data on behalf of the server computer (121) may be provided remotely.

The server computer (121) may include a generating component (903) arranged to generate one or more repayment instructions. The or each repayment instruction may instruct repayment of at least part of an outstanding amount, the outstanding amount equalling the amount owed by a subscriber for receiving a cash loan. The repayment instruction may include a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment.

The server computer (121) may include an identifying component (904) for identifying the one or more source accounts for repayment from the repayment source indicator or indicators.

The server computer (121) may include an initiating component (905) for initiating a transfer of funds from the one or more source accounts to a recovery account for a repayment amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount. The initiating component (905) may be configured to initiate, if the one or more source accounts include the subscriber wallet account, a transfer of funds

from the subscriber wallet account to the recovery account. The initiating component (905) may further be configured to initiate, if the one or more source accounts include the subscriber network usage account, a transfer of funds from the subscriber network usage account to the recovery account.

The initiating component (905) may include an interacting component (906) which interacts with the mobile wallet platform and the IN. The interacting component (906) may include a mobile wallet platform integration component (906B) configured to interact with the mobile wallet platform via a mobile wallet platform interface. The interacting component may further include an IN integration component (906A) configured to interact with the IN via an IN interface.

The server computer (121) may include a message receiving component (903) arranged to receive a request message requesting repayment of at least part of the outstanding amount. The request message may include one or more repayment source indicators and either or both the source amount and the repayment amount. The server computer may be configured to generate the one or more repayment instructions in response to receiving the request message.

The initiating component (904) may be arranged to initiate a transfer of funds from the repayment source to the recovery account by initiating a transfer of funds from the repayment source to a service provider wallet account if the repayment source is the subscriber wallet account or the subscriber network usage account. The initiating component (904) may be arranged to initiate the transfer of funds from the repayment source to the recovery account by initiating a transfer of funds from the repayment source to a service provider network usage account if the repayment source is the subscriber network usage account.

The initiating component (904) may further include an adjustment component (907) arranged to interact with one or both of the mobile wallet platform and the IN, via the interacting component 906), to adjust values of respective accounts maintained therein.

The server computer (121) may include a monitoring component (908) arranged to monitor for occurrence of a predefined condition. The predefined condition may include one or more of: loan repayment due date passed; and, inflow of funds detected at one or more source accounts

The server computer (121) may include a detecting component (910) configured to detect occurrence of the predefined condition. The server computer may be further configured to generate one or more repayment instructions in response to detecting occurrence of the predefined condition.

The generating component (909) may be arranged to auto-generate the request message in response to the server computer (121) detecting a predefined condition.

The server computer (121) may include a determining component (911) configured to determine an available balance of the one or more source accounts. The determining component may be configured to determine one or more of: the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, the repayment amount. Determining of the aforementioned parameters may be based on the available balance of one or more source accounts.

The determining component (911) may be arranged to determine an inequality or equality of the available balance of one or more source accounts relative to the repayment amount or the outstanding amount.

The determining component (911) may be configured to determine the repayment amount such that the repayment amount is less than or equal to the outstanding amount.

The server computer (121) may be configured to effect repayment from a first source account, and if unable to do so, effect repayment from a second source account. The server computer (121) may further be configured to effect partial repayment from either or both the first and second accounts. If repayment is to be effected from both accounts, the server computer (121) may be configured to determine the source amounts such that the repayment amount is less than or equal to the outstanding amount and each source amount is less than or equal to the available balance of the respective source accounts. The first source account may be a network usage account, and the second source account may be a wallet account, or vice versa.

Aspects of the present disclosure therefore provide a system and method for airtime as payment method for repayment of a cash loan.

Figure 10 illustrates an example of a computing device (900) in which various aspects of the disclosure may be implemented. The computing device (900) may be embodied as any form of data processing device including a personal computing device (e.g. laptop or desktop computer), a server computer (which may be self-contained, physically distributed over a number of locations), a client computer, or a communication device, such as a mobile phone (e.g. cellular telephone), satellite phone, tablet computer, personal digital assistant or the like. Different embodiments of the computing device may dictate the inclusion or exclusion of various components or subsystems described below.

The computing device (900) may be suitable for storing and executing computer program code. The various participants and elements in the previously described system diagrams may use any suitable number of subsystems or components of the computing device (900) to facilitate the functions described herein. The computing device (900) may include subsystems or components interconnected via a communication infrastructure (905) (for example, a communications bus, a network, etc.). The computing device (900) may include one or more processors (910) and at least one memory component in the form of computer-readable media. The one or more processors (910) may include one or more of: CPUs, graphical processing units (GPUs), microprocessors, field programmable gate arrays (FPGAs), application specific integrated circuits (ASICs) and the like. In some configurations, a number of processors may be provided and may be arranged to carry out calculations simultaneously. In some implementations various subsystems or components of the computing device (900) may be distributed over a number of physical locations (e.g. in a distributed, cluster or cloud-based computing configuration) and appropriate software units may be arranged to manage and/or process data on behalf of remote devices.

The memory components may include system memory (915), which may include read only memory (ROM) and random access memory (RAM). A basic input/output system (BIOS) may be stored in ROM. System software may be stored in the system memory (915) including operating system software. The memory components may also include secondary memory (920). The secondary memory (920) may include a fixed disk (921), such as a hard disk drive, and, optionally, one or more storage interfaces (922) for interfacing with storage components (923), such as removable storage components (e.g. magnetic tape, optical disk, flash memory drive, external hard drive, removable memory chip, etc.), network attached storage components (e.g. NAS drives), remote storage components (e.g. cloud-based storage) or the like.

The computing device (900) may include an external communications interface (930) for operation of the computing device (900) in a networked environment enabling transfer of data between multiple computing devices (900) and/or the Internet. Data transferred via the external communications interface (930) may be in the form of signals, which may be electronic, electromagnetic, optical, radio, or other types of signal. The external communications interface (930) may enable communication of data between the computing device (900) and other computing devices including servers and external storage facilities. Web services may be accessible by and/or from the computing device (900) via the communications interface (930).

The external communications interface (930) may be configured for connection to wireless communication channels (e.g., a cellular telephone network, wireless local area network (e.g. using Wi-Fi™), satellite-phone network, Satellite Internet Network, etc.) and may include an associated wireless transfer element, such as an antenna and associated circuitry.

The computer-readable media in the form of the various memory components may provide storage of computer-executable instructions, data structures, program modules, software units and other data. A computer program product may be provided by a computer-readable medium having stored computer-readable program code executable by the central processor (910). A computer program product may be provided by a non-transient or non-transitory computer-readable medium, or may be provided via a signal or other transient or transitory means via the communications interface (930).

Interconnection via the communication infrastructure (905) allows the one or more processors (910) to communicate with each subsystem or component and to control the execution of instructions from the memory components, as well as the exchange of information between subsystems or components. Peripherals (such as printers, scanners, cameras, or the like) and input/output (I/O) devices (such as a mouse, touchpad, keyboard, microphone, touch-sensitive display, input buttons, speakers and the like) may couple to or be integrally formed with the computing device (900) either directly or via an I/O controller (935). One or more displays (945) (which may be touch-sensitive displays) may be coupled to or integrally formed with the computing device (900) via a display or video adapter (940).

The foregoing description has been presented for the purpose of illustration; it is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Persons skilled in the relevant art can appreciate that many modifications and variations are possible in light of the above disclosure.

Any of the steps, operations, components or processes described herein may be performed or implemented with one or more hardware or software units, alone or in combination with other devices. Components or devices configured or arranged to perform described functions or operations may be so arranged or configured through computer-implemented instructions which implement or carry out the described functions, algorithms, or methods. The computer-implemented instructions may be provided by hardware or software units. In one embodiment, a software unit is implemented with a computer program product comprising a non-transient or non-transitory computer-readable medium containing computer program code, which can be executed by a processor for performing any or all of the steps, operations, or processes described. Software units or functions described in this application may be implemented as computer program code using any suitable computer language such as, for example, Java™, C++, or Perl™ using, for example, conventional or object-oriented techniques. The computer program code may be stored as a series of instructions, or commands on a non-transitory computer-readable medium, such as a random access memory (RAM), a read-only memory (ROM), a magnetic medium such as a hard-drive, or an optical medium such as a CD-ROM. Any such computer-readable medium may also reside on or within a single computational apparatus, and may be present on or within different computational apparatuses within a system or network.

Flowchart illustrations and block diagrams of methods, systems, and computer program products according to embodiments are used herein. Each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, may provide functions which may be implemented by computer readable program instructions. In some alternative implementations, the functions identified by the blocks may take place in a different order to that shown in the flowchart illustrations. Some portions of this description describe the embodiments of the invention in terms of algorithms and symbolic representations of operations on information. These algorithmic descriptions and representations, such as accompanying flow diagrams, are commonly used by those skilled in the data processing arts to convey the substance of their work effectively to others skilled in the art. These operations, while described functionally, computationally, or logically, are understood to be implemented by computer programs or

equivalent electrical circuits, microcode, or the like. The described operations may be embodied in software, firmware, hardware, or any combinations thereof. 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. It is therefore intended that the scope of the invention be limited not by this detailed description, but rather by any claims that issue on an application based hereon. Accordingly, the disclosure of the embodiments of the invention is intended to be illustrative, but not limiting, of the scope of the invention set forth in any accompanying claims. Finally, throughout the specification and any accompanying claims, unless the context requires otherwise, the word 'comprise' or variations such as 'comprises' or 'comprising' will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

CLAIMS:

1. A computer-implemented method comprising:

generating one or more repayment instructions, wherein the or each repayment instruction instructs repayment of at least part of an outstanding amount associated with a cash loan, the or each repayment instruction including a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment; and,

initiating a transfer of funds from the one or more source accounts to a recovery account for an amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount, including:

if the one or more source accounts include the subscriber wallet account, initiating a transfer of funds from the subscriber wallet account to the recovery account, including interacting with the mobile wallet platform via a mobile wallet platform interface to adjust values of respective accounts maintained therein; and,

if the one or more source accounts include the subscriber network usage account, initiating a transfer of funds from the subscriber network usage account to the recovery account, including interacting with the IN via an IN interface to adjust values of respective accounts maintained therein.

2. The method as claimed in claim 1, including receiving a request message requesting repayment of at least part of the outstanding amount, wherein the request message includes one or more repayment source indicators and either or both the one or more source amounts and a repayment amount, wherein generating the one or more repayment instructions is in response to receiving the request message.

3. The method as claimed in claim 2, wherein the request message is received from a communication device of a subscriber associated with the cash loan via a subscriber channel of the mobile wallet platform.

4. The method as claimed in claim 3, wherein the subscriber channel provides access to the mobile wallet platform via SMS, IVR, USSD, software application or web channels.

5. The method as claimed in claim 1, including monitoring for occurrence of a predefined condition including one or more of: loan repayment due date passed; and, inflow of funds detected at one of the one or more source accounts.

6. The method as claimed in claim 1, including detecting occurrence of a predefined condition, wherein detecting occurrence of the predefined condition triggers generating the one or more repayment instructions.

7. The method as claimed in claim 1, wherein the number of repayment instructions generated and the source amount of the or each repayment instruction is determined based on an available balance of one or both of the subscriber wallet account and the subscriber network usage account such that a sum of the one or more source amounts is less than or equal to the outstanding amount associated with the cash loan.

8. The method as claimed in claim 1, including determining, based on an available balance of one or more source accounts, one or more of: the number of repayment instructions to be generated; the source amount of the or each repayment instruction; the source account to be indicated by the repayment source indicator of the or each payment instruction; and, a repayment amount.

9. The method as claimed in claim 1, wherein the source amount of the or each repayment instruction is less than an available balance of the source account with which it is associated.

10. The method as claimed in claim 1, including:

determining whether a balance of a first source account is greater than or equal to a repayment amount; and,

if the balance of the first source account of the one or more source accounts is greater than or equal to the repayment amount, generating a repayment instruction including a repayment source indicator indicating the first source account and including a source amount being equal to the repayment amount.

11. The method as claimed in claim 10, including:

if the balance of the first source account is less than the repayment amount, determining whether a balance of a second source account is greater than or equal to the repayment amount; and,

if the balance of the second source account is greater than or equal to the repayment amount, generating a repayment instruction including a repayment source indicator indicating the second source account and a source amount being equal to the repayment amount.

12. The method as claimed in claim 11, including, if the balance of the second source account is less than the repayment amount:

determining a second source amount which is less than the balance of the second source account; and,

generating a repayment instruction including a repayment source indicator indicating the second source account and including the second source amount.

13. The method as claimed in claim 12, including:

determining whether a difference between the repayment amount and the second source amount is less than the balance of the first source account; and,

generating a repayment instruction including a repayment source indicator indicating the first source account and including a first source amount equal to the difference.

14. A system including a server computer comprising:

a generating component for generating one or more repayment instructions, wherein the or each repayment instruction instructs repayment of at least part of an outstanding amount associated with a cash loan, the or each repayment instruction including a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment;

an initiating component for initiating a transfer of funds from the one or more source accounts to a recovery account for an amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount, wherein the initiating component is configured:

to initiate, if the one or more source accounts include the subscriber wallet account, a transfer of funds from the subscriber wallet account to the recovery account, and

to initiate, if the one or more source accounts include the subscriber network usage account, a transfer of funds from the subscriber network usage account to

the recovery account, the initiating component including an interacting component which includes:

a mobile wallet platform integration component configured to interact with the mobile wallet platform via a mobile wallet platform interface,

an IN integration component configured to interact with the IN via an IN interface, and

an adjustment component configured to adjust values of respective accounts maintained therein.

15. A computer program product comprising a computer-readable medium having stored computer-readable program code for performing the steps of:

generating one or more repayment instructions, wherein the or each repayment instruction instructs repayment of at least part of an outstanding amount associated with a cash loan, the or each repayment instruction including a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment;

initiating a transfer of funds from the one or more source accounts to a recovery account for an amount being a sum of the one or more source amounts to effect repayment of at least part of the outstanding amount, including:

if the one or more source accounts include the subscriber wallet account, initiating a transfer of funds from the subscriber wallet account to the recovery account, including interacting with the mobile wallet platform via a mobile wallet platform interface to adjust values of respective accounts maintained therein; and,

if the one or more source accounts include the subscriber network usage account, initiating a transfer of funds from the subscriber network usage account to the recovery account, including interacting with the IN via an IN interface to adjust values of respective accounts maintained therein.

ABSTRACT

A system and method for integrated cross-platform account management is provided. A method includes generating one or more repayment instructions which instruct repayment of at least part of a cash loan. Each instruction includes a source amount and a repayment source indicator indicating either a subscriber wallet account maintained by a mobile wallet platform or a subscriber network usage account maintained by an intelligent network (IN) of a mobile network operator (MNO) as a source account for repayment. The method further includes initiating a transfer of funds from the one or more source accounts to a recovery account for a repayment amount equal to the sum of the one or more source amounts to effect repayment of at least part of the cash loan.

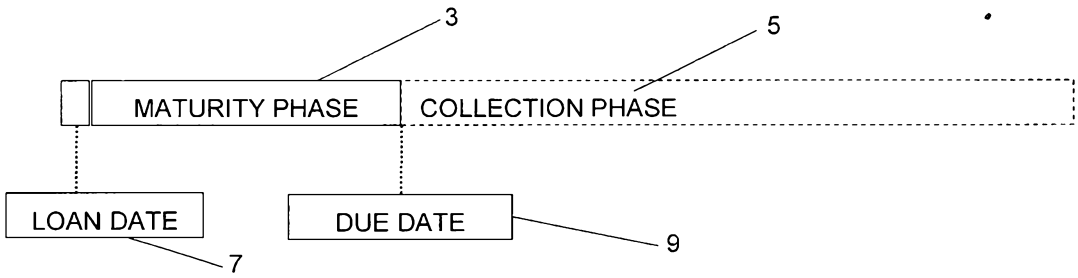

FIGURE 1

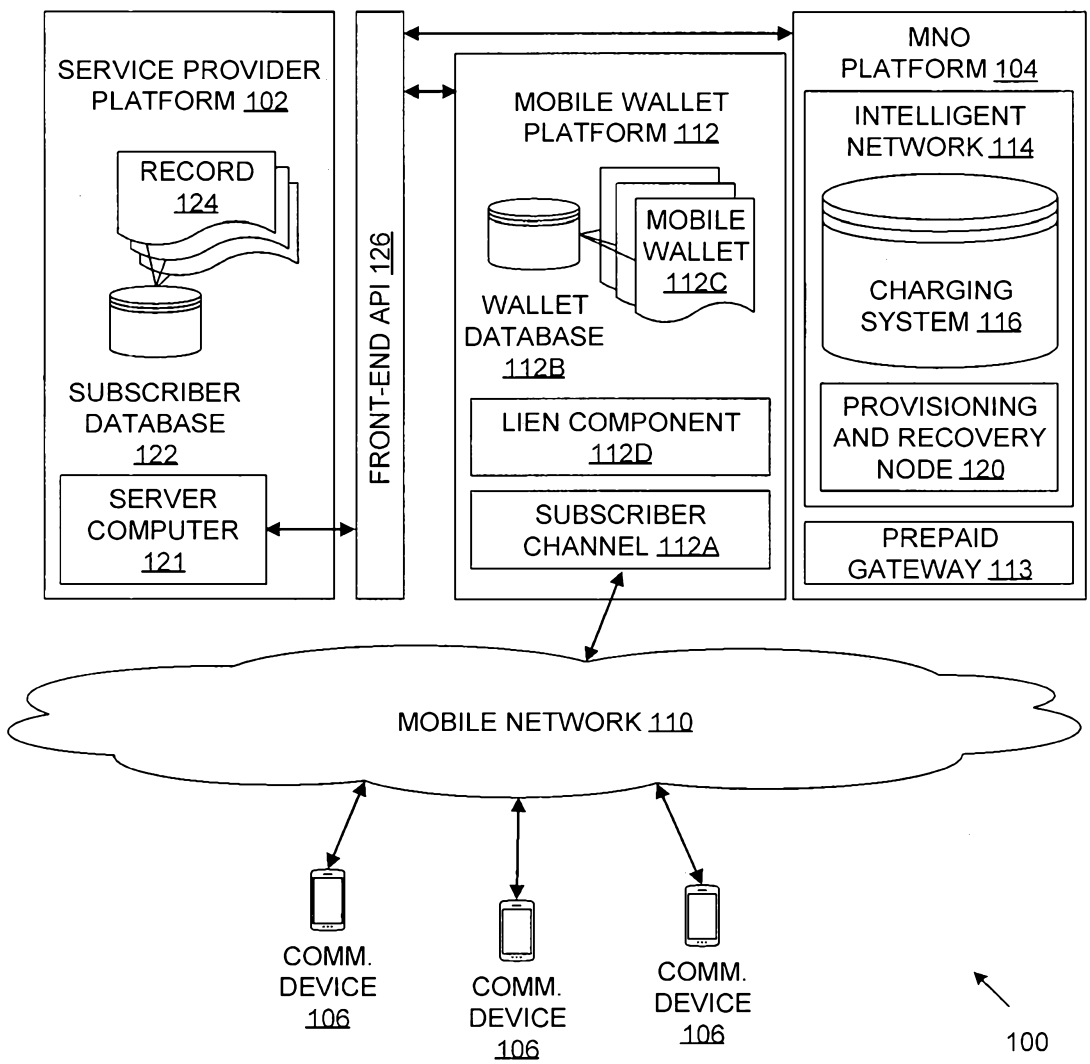

FIGURE 2

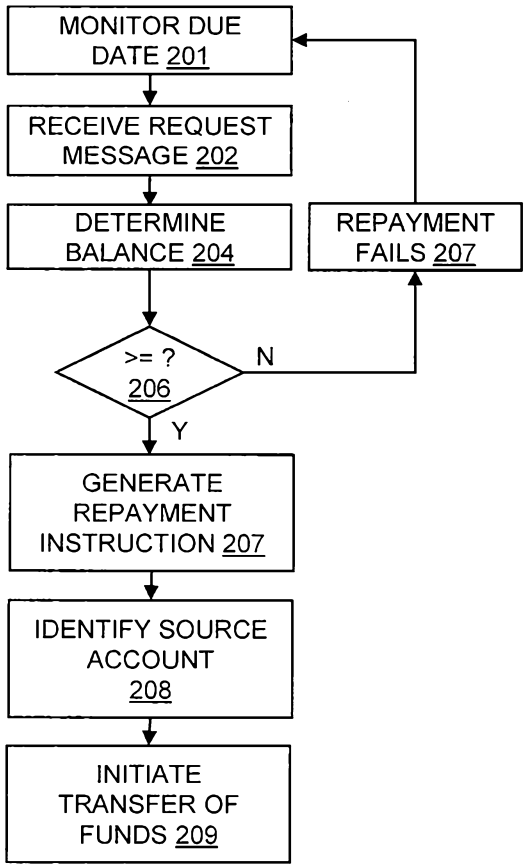

FIGURE 3A

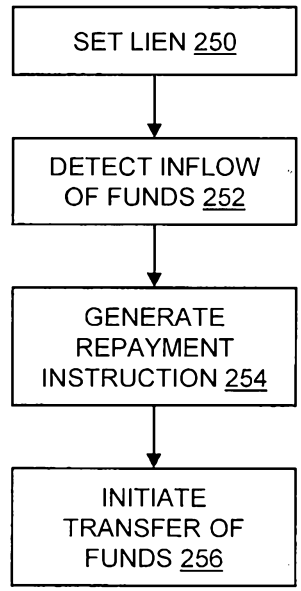

FIGURE 3C

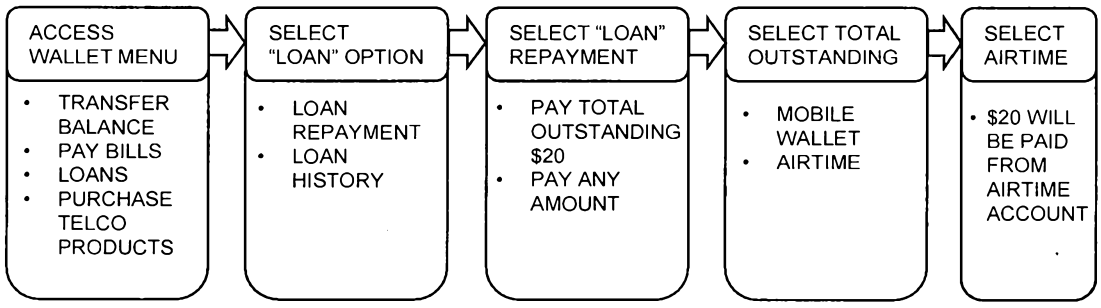

FIGURE 4

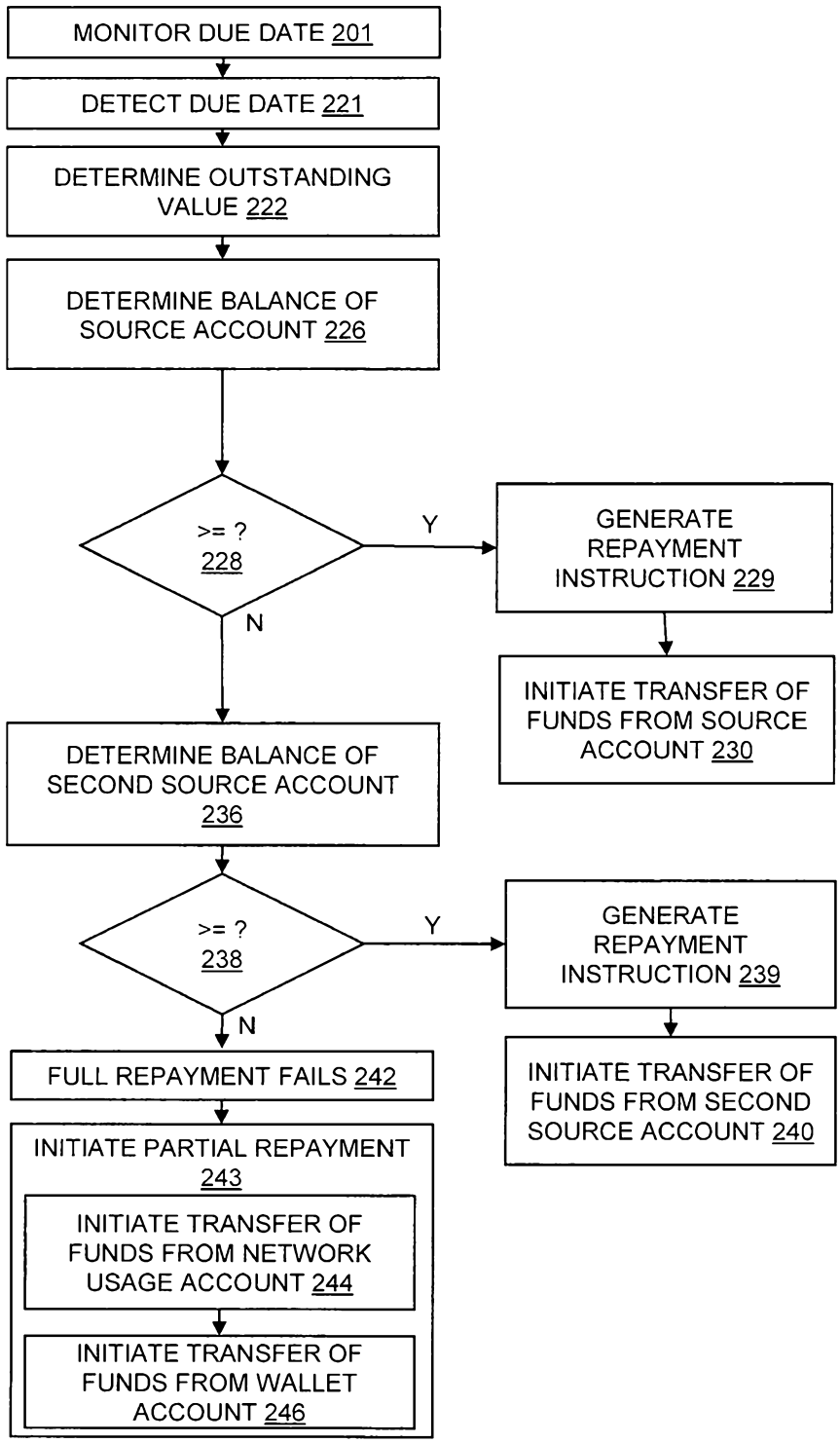
MONITOR DUE DATE 201
DETECT DUE DATE 221
DETERMINE OUTSTANDING VALUE 222
DETERMINE BALANCE OF SOURCE ACCOUNT 226
>= ? 228
Y
GENERATE REPAYMENT INSTRUCTION 229
INITIATE TRANSFER OF FUNDS FROM SOURCE ACCOUNT 230
N
DETERMINE BALANCE OF SECOND SOURCE ACCOUNT 236
>= ? 238
Y
GENERATE REPAYMENT INSTRUCTION 239
INITIATE TRANSFER OF FUNDS FROM SECOND SOURCE ACCOUNT 240
N
FULL REPAYMENT FAILS 242
INITIATE PARTIAL REPAYMENT 243
INITIATE TRANSFER OF FUNDS FROM NETWORK USAGE ACCOUNT 244
INITIATE TRANSFER OF FUNDS FROM WALLET ACCOUNT 246

FIGURE 3B

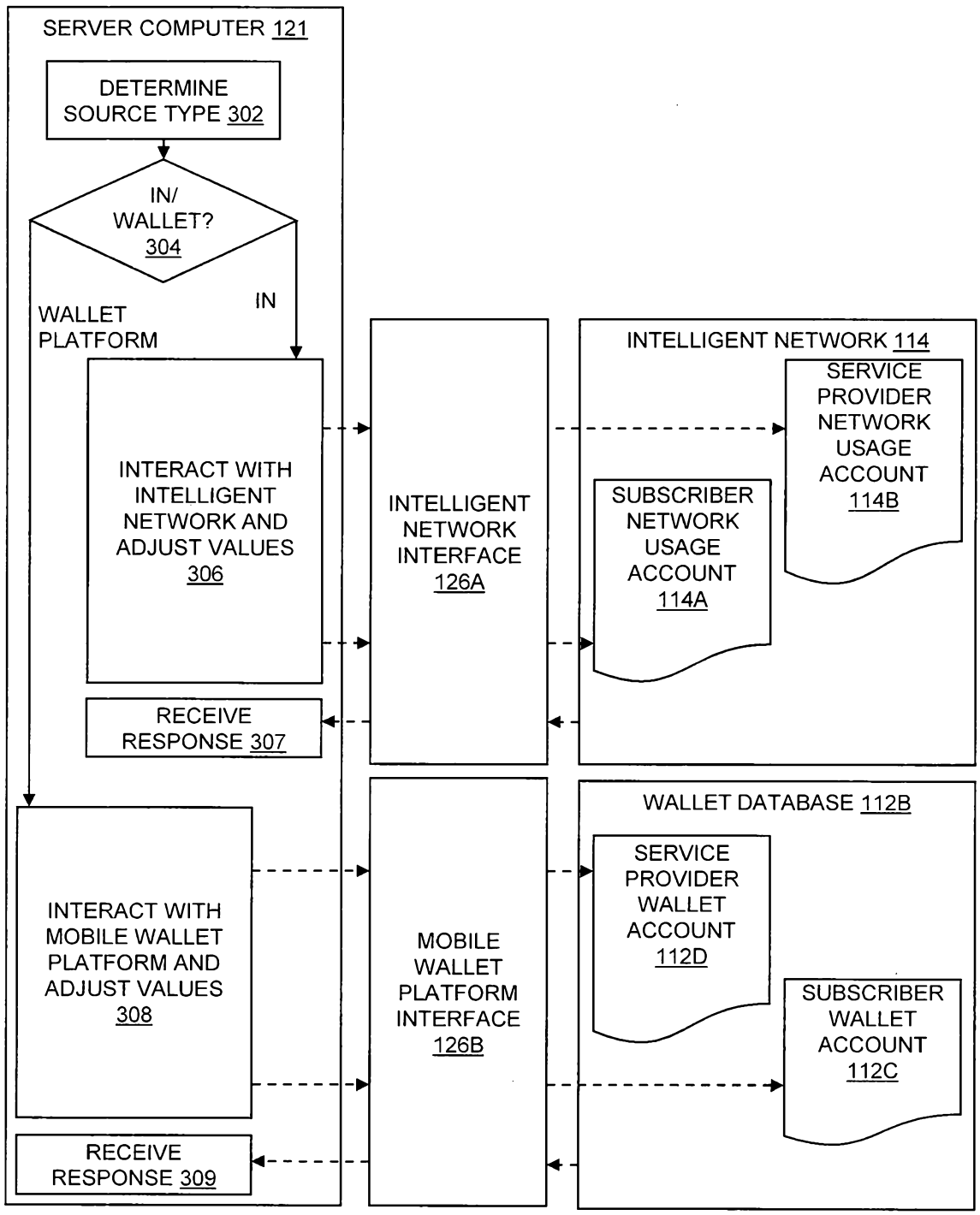
SERVER COMPUTER 121
DETERMINE SOURCE TYPE 302
IN/ WALLET? 304
IN
WALLET PLATFORM
INTERACT WITH INTELLIGENT NETWORK AND ADJUST VALUES 306
RECEIVE RESPONSE 307
INTERACT WITH MOBILE WALLET PLATFORM AND ADJUST VALUES 308
RECEIVE RESPONSE 309
INTELLIGENT NETWORK INTERFACE 126A
MOBILE WALLET PLATFORM INTERFACE 126B
INTELLIGENT NETWORK 114
SERVICE PROVIDER NETWORK USAGE ACCOUNT 114B
SUBSCRIBER NETWORK USAGE ACCOUNT 114A
WALLET DATABASE 112B
SERVICE PROVIDER WALLET ACCOUNT 112D
SUBSCRIBER WALLET ACCOUNT 112C

FIGURE 3D

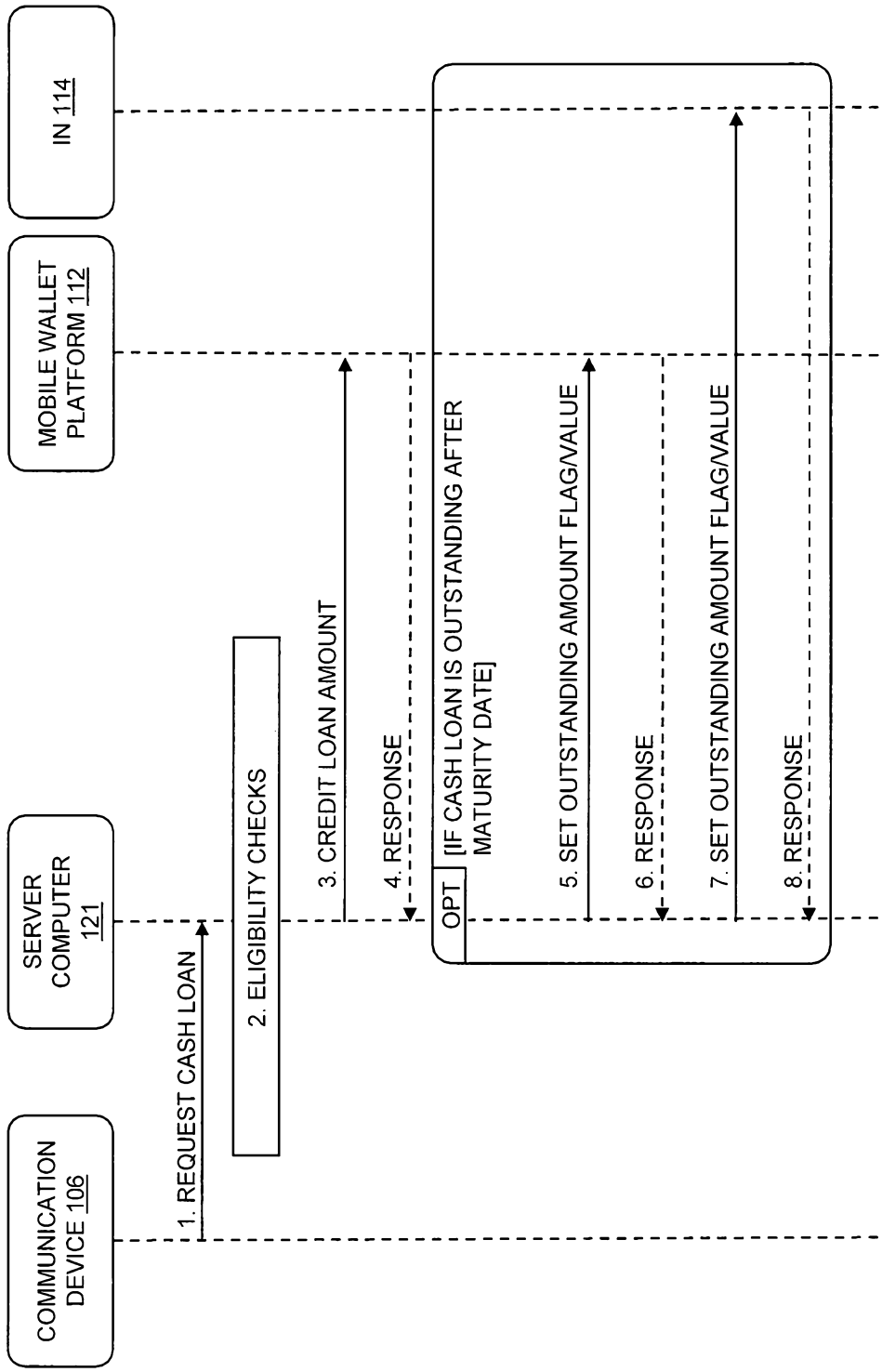
COMMUNICATION DEVICE 106
SERVER COMPUTER 121
MOBILE WALLET PLATFORM 112
IN 114
1. REQUEST CASH LOAN
2. ELIGIBILITY CHECKS
3. CREDIT LOAN AMOUNT
4. RESPONSE
OPT
[IF CASH LOAN IS OUTSTANDING AFTER MATURITY DATE]
5. SET OUTSTANDING AMOUNT FLAG/VALUE
6. RESPONSE
7. SET OUTSTANDING AMOUNT FLAG/VALUE
8. RESPONSE

FIGURE 5

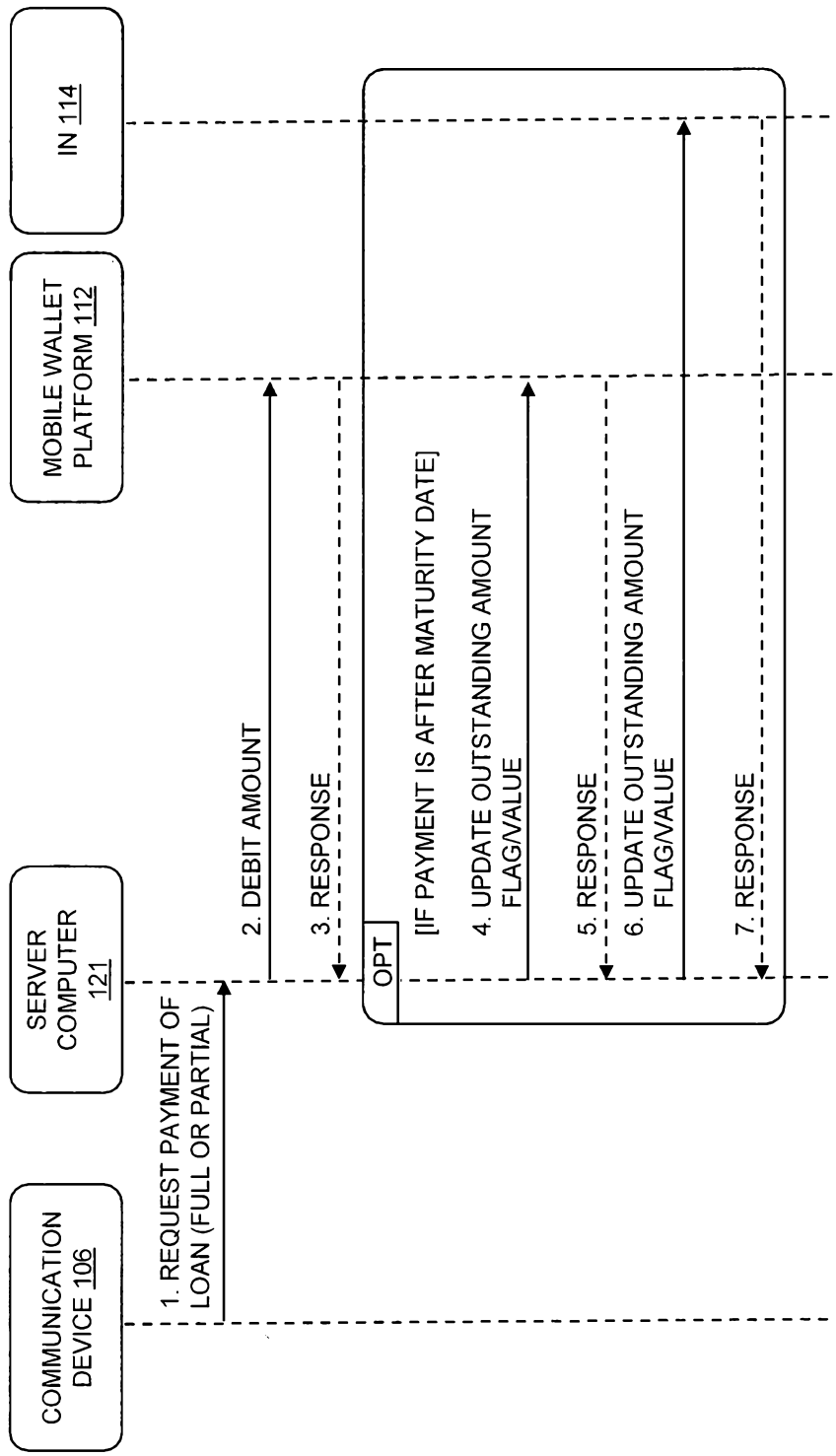
COMMUNICATION DEVICE 106
SERVER COMPUTER 121
MOBILE WALLET PLATFORM 112
IN 114
1. REQUEST PAYMENT OF LOAN (FULL OR PARTIAL)
2. DEBIT AMOUNT
3. RESPONSE
OPT
[IF PAYMENT IS AFTER MATURITY DATE]
4. UPDATE OUTSTANDING AMOUNT FLAG/VALUE
5. RESPONSE
6. UPDATE OUTSTANDING AMOUNT FLAG/VALUE
7. RESPONSE

FIGURE 6

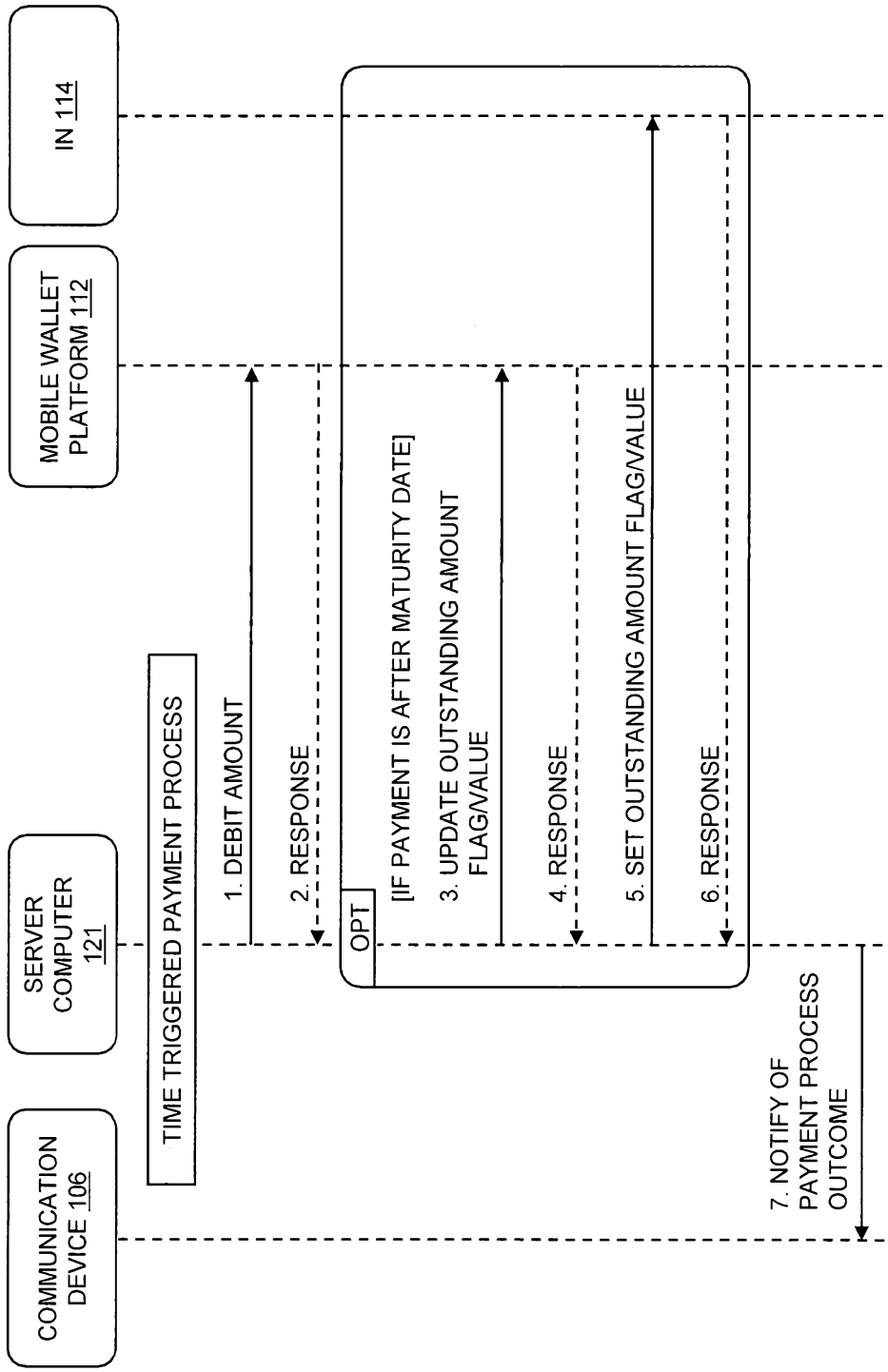
COMMUNICATION DEVICE 106
SERVER COMPUTER 121
MOBILE WALLET PLATFORM 112
IN 114
TIME TRIGGERED PAYMENT PROCESS
1. DEBIT AMOUNT
2. RESPONSE
OPT
[IF PAYMENT IS AFTER MATURITY DATE]
3. UPDATE OUTSTANDING AMOUNT FLAG/VALUE
4. RESPONSE
5. SET OUTSTANDING AMOUNT FLAG/VALUE
6. RESPONSE
7. NOTIFY OF PAYMENT PROCESS OUTCOME

FIGURE 7

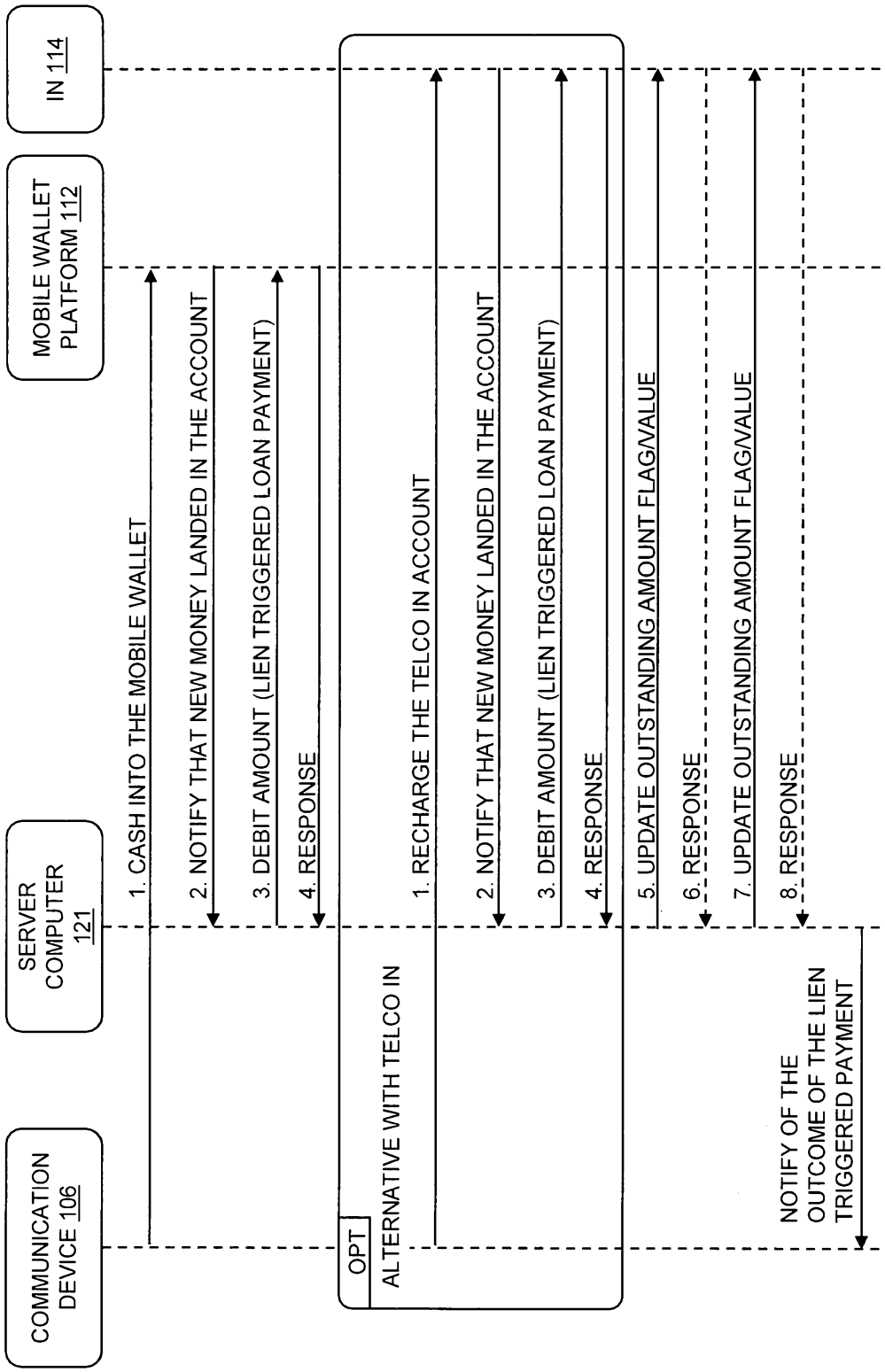
COMMUNICATION DEVICE 106
SERVER COMPUTER 121
MOBILE WALLET PLATFORM 112
IN 114
1. CASH INTO THE MOBILE WALLET
2. NOTIFY THAT NEW MONEY LANDED IN THE ACCOUNT
3. DEBIT AMOUNT (LIEN TRIGGERED LOAN PAYMENT)
4. RESPONSE
OPT
ALTERNATIVE WITH TELCO IN
1. RECHARGE THE TELCO IN ACCOUNT
2. NOTIFY THAT NEW MONEY LANDED IN THE ACCOUNT
3. DEBIT AMOUNT (LIEN TRIGGERED LOAN PAYMENT)
4. RESPONSE
5. UPDATE OUTSTANDING AMOUNT FLAG/VALUE
6. RESPONSE
7. UPDATE OUTSTANDING AMOUNT FLAG/VALUE
8. RESPONSE
NOTIFY OF THE OUTCOME OF THE LIEN TRIGGERED PAYMENT

FIGURE 8

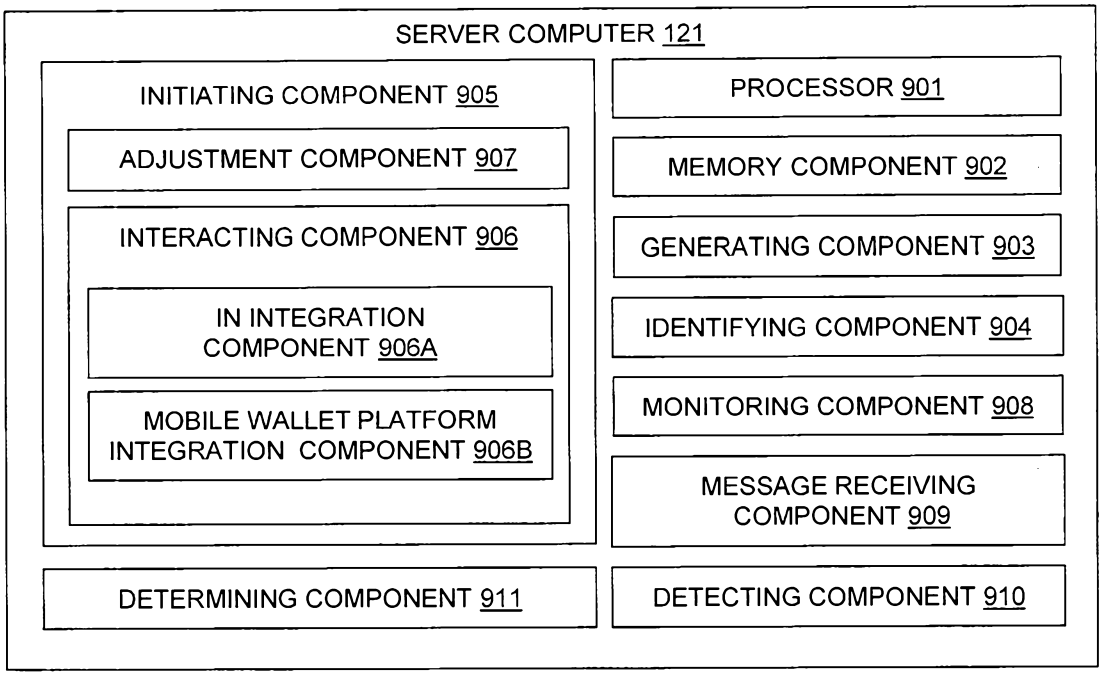

FIGURE 9

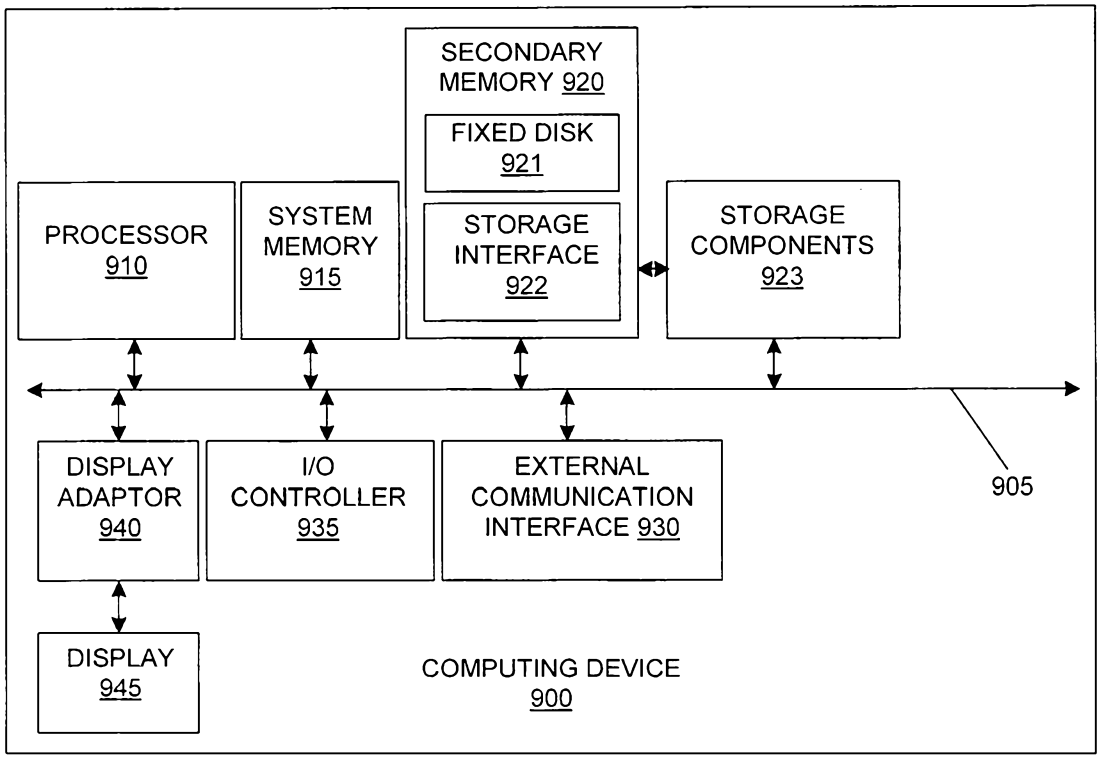

FIGURE 10