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(54) **Titre : Provision and recovery of network usage advances.**

(57) **Abrégé :**

A system and method for provision and recovery of network usage advances are described. In a method, a network usage advance request, including a subscriber identifier and a first amount associated with the advance, is received. A balance control flag associated with the subscriber identifier is switched from a first state to a second state. Transactions relating to a deduction from a main account leaving a balance of the main account as negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state. While the balance control flag is in the second state, a second amount associated with the first amount is deducted from the main account associated with the subscriber identifier. The first amount is provisioned to a dedicated account associated with the subscriber identifier, with further transactions being recorded against the dedicated account.

Fig. 3

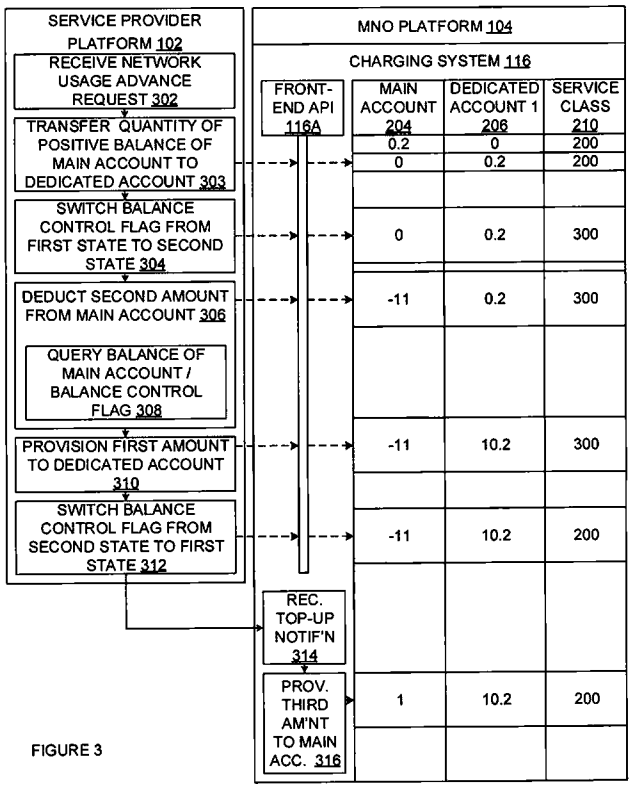

FIGURE 3

PROVISION AND RECOVERY OF NETWORK USAGE ADVANCES

FIELD OF THE INVENTION

This invention relates to systems and methods for the provision and recovery of network usage advances, such as airtime or mobile bundle advances to prepaid mobile subscribers.

BACKGROUND TO THE INVENTION

A "prepaid mobile subscriber", or simply "subscriber", may be any user of a prepaid mobile communication service hosted on a mobile telephone network. The prepaid mobile subscriber may have a communication device with which the prepaid mobile subscriber may be able to conduct telephonic transactions such as making phone calls, sending short messaging service (SMS) messages, using mobile data and the like. The conducting of transactions over a mobile telephone network incurs charges for the subscriber. These charges may be recorded against an account associated with the subscriber. Typically, on prepaid accounts, the prepaid services require the balance of the subscriber's account to be positive for the subscriber to be able to conduct telephonic transactions. The positive balance of a prepaid subscriber's account is typically colloquially referred to as "airtime" against which transactions are recorded.

Airtime and mobile bundle advance systems are known in the art. Such systems enable airtime or mobile bundles to be advanced to prepaid mobile subscribers in advance of payment, i.e. on credit. Such systems enable subscribers who have depleted airtime and/or mobile bundle balances to continue to transact on a mobile telephone network, for example by making phone calls, exchanging data messages, sending SMS messages or the like.

The understanding of course is that the subscriber having accepted or made use of an airtime or mobile bundle advance will repay the advance, and in some cases a fee as well, in due course by purchasing more airtime.

A simple implementation of an airtime advance system may for example deduct a monetary value associated with the airtime advance from an airtime account (termed a "main account" herein) against which the subscriber's use of the mobile telephone network is normally charged. The amount of airtime advanced is then recorded in a separate account (termed a "dedicated account" herein) against which further use of the mobile telephone network may be charged. As airtime

advances are typically provided when the balance of the main account of the subscriber is low or even zero, the deduction of the monetary value associated with the airtime advance may cause the balance of the main account to go negative.

However, some mobile network operators (MNOs) may configure their charging systems to prevent or prohibit the balance of a subscriber's main account from being negative. Such configuration may be to prevent revenue leaks which could potentially be detrimental to the business of the MNO.

Such rules imposed on the configuration of the charging system may make it technically challenging to implement an airtime advance service while still providing adequate protection against revenue leaks. It may also be that the relevant MNOs are not inclined to permit changes to such configurations in order to protect their revenue streams. There is accordingly a need for a technical solution which overcomes these challenges, at least to some extent.

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

According to an aspect of the invention there is provided a computer-implemented method comprising: receiving a network usage advance request, the network usage advance request including a subscriber identifier and a first amount associated with a network usage advance, wherein a network usage advance enables network usage in advance of received payment; switching a balance control flag associated with the subscriber identifier from a first state to a second state, wherein the balance control flag is queried by a charging system of a mobile telephone network when recording transactions against a main account associated with the subscriber identifier, the transactions being associated with usage of the mobile telephone network by a subscriber associated with the subscriber identifier, and wherein transactions relating to a deduction from the main account after which a balance of the main account would be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state; while the balance control flag is in the second state, deducting a second amount associated with the first amount from the main account associated

with the subscriber identifier; and, provisioning the first amount to a dedicated account associated with the subscriber identifier, wherein further transactions associated with usage of the mobile telephone network by the subscriber are recorded against the dedicated account.

Further features provide for the method to include switching the balance control flag from the second state to the first state; and for switching the balance control flag from the second state to the first state to be immediately in response to the deducting or provisioning operations.

Still further features provide for switching the balance control flag to be associated with permissions, and for the method to include satisfying permissions prior to switching the balance control flag.

The method may be conducted at a service provider platform which interfaces with an intelligent network (IN) of the mobile telephone network to switch the balance control flag and adjust the main account and dedicated account balances. Alternatively, the method may be conducted at a network node of an intelligent network (IN) of the mobile telephone network.

Yet further features provide for the method to include: receiving a top-up notification including a subscriber identifier and a third amount, wherein the third amount is a top-up amount by which the balance of the main account associated with the subscriber is to be increased; and, provisioning the third amount to the main account to effect partial or complete recovery of the second amount; for complete recovery of the second amount to be effected if the third amount is greater than or equal to the first amount; for partial recovery of the second amount to be effected if the third amount is less than the first amount; and for partial or complete recovery of the second amount to be effected immediately in response to provisioning the third amount to the main account.

Further features provide for the method to include, if upon receiving the network usage advance request the balance of the main account is positive, transferring a fourth amount corresponding to the positive balance of the main account to the dedicated account; and for transferring the fourth amount to the dedicated account to be prior to deducting the second amount from the main account.

Still further features provide for the network usage advance request to be received from a mobile handset associated with the subscriber identifier, and for the network usage advance request to

be received via one of: a short messaging service (SMS) message, an unstructured supplementary service data (USSD) message or an interactive voice response (IVR) message.

Yet further features provide for the network usage advance request to relate to a request for an amount of airtime in advance, for the first amount to be the amount of airtime to be advanced and for the second amount is a monetary value associated with the amount of airtime and optionally to include a fee.

Still further features provide for the network usage advance request to relate to a request for a particular category of mobile telephone network utilisation, for the first amount to be a usage limit in respect of the particular category of mobile telephone network utilisation, and for the second amount to be a monetary value associated with the usage limit and optionally to include a fee; for the particular category of mobile telephone network utilisation to be one of: an SMS bundle advance request; a data bundle advance request; and, a voice minutes bundle advance request, and for the usage limit to be one of: a number of SMS messages which may be transmitted from a mobile handset associated with the subscriber identifier; a number of bytes which may be exchanged between the mobile handset and a data communication network; and, a duration of telephone calls that may be initiated from the mobile handset.

Further features provide for the balance control flag to be implemented as a service class associated with the subscriber identifier, and for the method to include provisioning a new service class associated with the second state.

According to a further aspect of the invention there is provided a system comprising: a processor and a memory configured to provide computer program instructions to the processor to execute functions of components; a network usage advance request receiving component for receiving a network usage advance request, the network usage advance request including a subscriber identifier and a first amount associated with a network usage advance, wherein a network usage advance enables network usage in advance of received payment; a balance control flag switching component for switching a balance control flag associated with the subscriber identifier from a first state to a second state, wherein the balance control flag is queried by a charging system of a mobile telephone network when recording transactions against a main account associated with the subscriber identifier, the transactions being associated with usage of the mobile telephone network by a subscriber associated with the subscriber identifier, and wherein transactions relating to a deduction from the main account after which a balance of the main account would

be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state; a main account deducting component for, while the balance control flag is in the second state, deducting a second amount associated with the first amount from the main account associated with the subscriber identifier; and, a dedicated account provisioning component for provisioning the first amount to a dedicated account associated with the subscriber identifier, wherein further transactions associated with usage of the mobile telephone network by the subscriber are recorded against the dedicated account.

According to 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: receiving a network usage advance request, the network usage advance request including a subscriber identifier and a first amount associated with a network usage advance, wherein a network usage advance enables network usage in advance of received payment; switching a balance control flag associated with the subscriber identifier from a first state to a second state, wherein the balance control flag is queried by a charging system of a mobile telephone network when recording transactions against a main account associated with the subscriber identifier, the transactions being associated with usage of the mobile telephone network by a subscriber associated with the subscriber identifier, and wherein transactions relating to a deduction from the main account after which a balance of the main account would be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state; while the balance control flag is in the second state, deducting a second amount associated with the first amount from the main account associated with the subscriber identifier; and, provisioning the first amount to a dedicated account associated with the subscriber identifier, wherein further transactions associated with usage of the mobile telephone network by the subscriber are recorded against the dedicated account.

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.

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 an exemplary system for the provision and recovery of network usage advances;

Figure 2 illustrates an exemplary data structure which may be maintained by a charging system of an MNO;

Figure 3 is a swim-lane flow diagram which illustrates an exemplary method for provision and recovery of network usage advances in which respective swim-lanes delineate steps, operations or procedures performed by respective entities or devices;

Figure 4 is a block diagram which illustrates exemplary components which may be provided by a system for the provision and recovery of network usage advances; and

Figure 5 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 are directed towards airtime and mobile bundle (collectively "network usage") advance systems and methods. A network usage advance may be a provision of services before payment has been received or in advance of payment in a prepaid model. A network usage advance may for example enable mobile telephone network usage by an associated prepaid subscriber in advance of received payment.

In particular, aspects of the present disclosure are directed towards the provisioning of network usage advances in such a way that outstanding loan amounts associated with the network usage advances can be recovered immediately upon top-up or other injection of funds initiated by or on behalf of the relevant subscriber. This may be achieved by provisioning, in association with a subscriber identifier (e.g. an MSISDN), a dedicated loan account (termed herein a "dedicated account") which receives the network usage advance. Additionally, a balance control flag may be provisioned in association with the subscriber identifier.

The balance control flag may be configured to be queried by a charging system maintained by the MNO when recording transactions (which associated with usage of the mobile telephone network) against a main account associated with the subscriber. The balance control flag may be configured to be toggled between first and second states, where: transactions relating to a deduction from the main account which would leave the main account with a negative balance are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state.

The balance control flag may be an on/off field in a data structure (e.g. in the IN/charging system of the MNO) which can be switched between first and second states and which can be queried by other components or nodes of the IN/charging system. In some implementations, the balance control flag may be provided by a new service class which is provisioned to allow adjustment of the main account with a negative value. The balance control flag may be set temporarily, in order to adjust the main account, after which it may be reverted to its previous state.

Use of the balance control flag may overcome challenges introduced because of the particular configuration of the charging system required by some MNOs, namely configuration to prevent or prohibit the balance of a subscriber's main account from being negative so as to prevent revenue leaks.

Figure 1 is a schematic diagram which illustrates an exemplary system (100) for the provision and recovery of network usage advances. The system (100) may include a service provider platform (102) and an MNO platform (104). The service provider platform may be provided by a third party service provider which provides network usage advance services to the MNO and its prepaid subscribers. In other implementations, the functionality of the service provider platform may be built-in or integrated with the MNO platform (without the need for a third party service provider). The system may further include mobile handsets (106) associated with prepaid mobile subscribers who typically purchase airtime and mobile bundle advances to make use of a mobile telephone network (110) provided by the MNO.

The service provider platform (102) may be provided by any suitable computing device. The service provider platform (102) may be configured to interface with the MNO platform (104). For example, the service provider platform may be configured to interface with an intelligent network (IN) and/or charging system of the MNO platform via an appropriate IN integration component.

Interfacing with the IN and/or charging system may enable the service provider platform to access and update selected data records stored therein.

The service provider platform (102) may be in communication with the mobile handsets (106) via the mobile telephone network (110) via which data and/or messages may be transmitted to and received from the respective mobile handsets. The service provider platform may for example be configured to receive network usage advance requests from the mobile handsets and to transmit notifications relating to network usage advance requests to the mobile handsets.

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

The MNO platform (104) may include an IN (114) and a charging system (116). The IN (114) 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 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. The charging system (116) may be implemented as a high-throughput database that maintains multiple accounts of each subscriber. The purpose, type and usage of the accounts may be defined by the MNO. In the illustrated embodiment, each subscriber may be associated with a main account, a dedicated account and a service class. Airtime top-ups may be provisioned to the main account and usage of the mobile telephone network (110) may be charged against the main account. Airtime advances may be provisioned to the dedicated account and, once provisioned, further use of the mobile telephone network may be charged against the dedicated

account (until the balance thereof has been depleted). The charging system may maintain a data structure in which each rows are associated with subscribers (identified by way of a subscriber identifier, such as an MSISDN) and columns are associated with accounts. An exemplary data structure (200) which may be maintained by the charging system (116) is illustrated in Figure 2.

The service class may be one of the fields stored in a subscriber profile linked to the subscriber identifier. Other fields stored in the subscriber profile may include: an activation date, an expiration date, a first call flag and the like. The service class may be used by the operator to group the subscribers and assign tariffs, services, etc.

In accordance with some aspects of the present disclosure, the service class associated with each subscriber may be configured to operate as a balance control flag which can be toggled between first and second states. The service class, and hence balance control flag, may be queried by the charging system (116) when recording transactions against the main account associated with the subscriber. A new service class may be provisioned in which transactions causing the balance of the main account to decrease below zero may be permitted.

Thus the service class may be toggled between first and second states, where transactions relating to a deduction from the main account after which the balance of the main account would be negative are prohibited in the first state and permitted in the second state. In this manner, the rules of the charging system may be temporarily changed during provisioning of a network usage advance.

The charging system (116) may include a front-end API (116A) by way of which the service provider platform (102) may interface with the charging system (116).

The system (100) described above may implement a method for provision and recovery of network usage advances. An exemplary method for provision and recovery of network usage advances is illustrated in the swim-lane flow diagram of Figure 3 in which respective swim-lanes delineate steps, operations or procedures performed by respective entities or devices. In the illustrated embodiment, certain steps, operations or procedures are performed by the service provider platform (102) which interfaces with the IN (114) of the MNO platform (104) via an IN interface. It should however be appreciated that in other embodiments, the functionality of the service provider platform may be incorporated in the IN, such that the described steps, operations or procedures are performed by one or more nodes of the IN.

The method may commence with the MNO platform provisioning or otherwise instantiating the dedicated account (206) associated with the subscriber identifier. In some cases, a dedicated account (208) for airtime and for each category of mobile telephone network utilisation (e.g. SMS, data, voice) may be provisioned. The method may also include provisioning or otherwise instantiating a balance control flag associated with the subscriber identifier. These provisioning operations may include adding columns to a data structure (200) maintained by the charging system (116) of the MNO. In some implementations, the balance control flag may be implemented or embodied as a service class associated with the subscriber identifier, and provisioning the balance control flag may include provisioning a new service class associated with the second state.

The service provider platform (102) may receive (302) a network usage advance request. The network usage advance request may include or be associated with a subscriber identifier (e.g. an MSISDN, IMSI or the like) and a first amount associated with the network usage advance requested.

In some implementations, the network usage advance request may be received from a mobile handset (106) of a prepaid subscriber. For example, the network usage advance request may be received via one of: a SMS message, a USSD message or an IVR message. The request may be initiated by the subscriber sending a predefined message to an SMS short code (e.g. sending "ADVANCE USD 10" to the number 12345), dialling a USSD short code and selecting an amount, being the first amount, offered as an advance or the like.

It should be appreciated the various steps or operations may precede the receiving of the network usage advance request, such as a determination and/or selection of the first amount, evaluating subscriber eligibility (e.g. credit scoring) and the like. In other implementations, the network usage advance request may be received from the MNO platform or may be generated internally by the service provider platform as a part of an automated network advance service that is for example trigged should the balance of a main account associated with the subscriber identifier drop below a predetermined threshold, should the subscriber attempt a transaction for which he or she has insufficient balance, or the like.

The network usage advance request may relate to a request for an amount of airtime in advance, in which case the first amount may be the amount of airtime to be advanced (e.g. USD 10).

Otherwise, the network usage advance request may relate to a request for a particular category of mobile telephone network utilisation in advance, for example one of: an SMS bundle advance request; a data bundle advance request; and, a voice minutes bundle advance request. In such a case, the first amount may be a usage limit in respect of the particular category of mobile telephone network utilisation, for example being one of: a number of SMS messages which may be transmitted from the subscriber's mobile handset; a number of bytes which may be exchanged between the mobile handset and a data communication network; and, a duration of telephone calls that may be initiated from the mobile handset.

In some implementations, if upon receiving the network usage advance request the balance of the main account (204) is positive, the service provider platform (102) may transfer (303) the quantity of the positive balance of the main account (204) to the dedicated account (206). This may be performed prior to deducting the second amount from the main account (204) or at any other suitable stage and may be effected by the service provider platform instructing the charging system (116) to perform the transfer via a front-end API (116A) of the charging system, which is exposed to the service provider platform. For example, the main account may have a balance of USD0.2 which may be transferred to the dedicated account.

The service provider platform (102) may switch (304) a balance control flag associated with the subscriber identifier from a first state, in which transactions causing a balance of the main account (204) to decrease below zero are prohibited, to a second state, in which transactions causing the balance of the main account (204) to decrease below zero are permitted.

The balance control flag may be associated with permissions (e.g. a permissions list) which provide rules for switching or changing the balance control flag. The service provider platform (102) may satisfy these permissions prior to switching the balance control flag, for example by authenticating itself with the MNO platform (104) or the like.

As mentioned the balance control flag may be provided by a service class (210) which is maintained in the data structure (200) in association with the subscriber identifier (202). The first state may for example be represented by a value of 200 while the second state may be represented by a value of 300. Toggling from one state to the next me include overwriting the existing state (e.g. 200) with the new state (e.g. 300).

The service provider platform (102) switching (304) the balance control flag from the first state to

the second state may include the service provider platform (102) instructing the charging system (116) to switch the service class (e.g. from '200' to '300') via the front-end API (116A) of the charging system (116).

While the balance control flag is in the second state, the service provider platform (102) may deduct (306) a second amount, which is associated with the first amount, from the main account (204) associated with the subscriber identifier (202). Deducting (306) the second amount may have the effect of reducing the balance of the main account (204) (e.g. equivalent to a debit operation to record a sum owed).

Deducting (306) the second amount may include the service provider platform (102) instructing the charging system (116) to deduct the second amount via the front-end API (116A) of the charging system (116). Deducting the second amount (306) may include the charging system (116) querying (308) one or both of the balance of the main account (204) and the balance control flag to ascertain whether or not the transaction is permissible. It should be appreciated that this may entail establishing the effect which the proposed deduction would have on the main account (204), and if that effect would be to leave the main account with a negative balance (even if it already has a negative balance), then the transaction, when the balance control flag is in the first state, must be declined or prohibited. It should be appreciated that transactions which provision amounts to the main account and which, despite the provisioning, would leave the main account with a negative balance may be allowed in all circumstances (e.g. irrelevant of the state to which the balance control flag is set).

In the case of the network usage advance request being an airtime advance request, the second amount may be a monetary value associated with the amount of airtime and may optionally include a fee. In cases where airtime is denominated in a local currency (e.g. USD, ZAR, etc.), the monetary value of the amount of airtime and the amount of airtime may be the same (e.g. USD 10). If a fee is included, the second amount may then be USD 11 (corresponding to a 10% fee). In the case of the network usage advance request being a request for a particular category of mobile telephone network utilisation in advance, the second amount may a monetary value associated with the usage limit and may optionally include a fee. For example, an SMS bundle for sending 20 SMS messages may be associated with a monetary value of R20. If a fee is included, the second amount may then be R22 (corresponding to a 10% fee).

The service provider platform (102) may provision (310) the first amount (e.g. USD10) to the

dedicated account (206) associated with the subscriber identifier. Provisioning (310) the first amount to the dedicated account may have the effect of increasing the balance of the dedicated account by the first amount (e.g. may be equivalent to a credit operation).

Further transactions associated with usage of the mobile telephone network (110) by the subscriber may be recorded against the dedicated account (206). Recording transactions against the dedicated account (206) may have the effect of reducing the balance of the dedicated account (e.g. may be equivalent to debit operations). In the case of the request having been for a particular category of network utilisation, the dedicated account (206) may be associated with that particular category of network utilisation and only further usage of that category of network utilisation will be dedicated from the dedicated account.

The service provider provisioning (310) the first amount to the dedicated account (206) may include the service provider platform instructing the charging system (116) to provision the first amount to the dedicated account via the front-end API (116A) of the charging system (116).

The service provider platform (102) may switch (312) the balance control flag from the second state to the first state. In other words, the balance control flag is reverted to the state in which deductions from the main account which would have the effect of leaving the main account (204) with a negative balance are prohibited.

Switching (312) the balance control flag from the second state to the first state may be performed immediately in response to either the deducting (306) or provisioning (310) operations described above. It should be appreciated that the operations of deducting the second amount and provisioning the first amount (and any associated operations) may be performed in quick succession and may take only a few milliseconds, or less. It is therefore anticipated that the balance control flag may be left in the second state for a very short period of time, thus minimising the possible exposure of the MNO to revenue leaks.

The service provider platform (102) switching the balance control flag may include the service provider platform instructing the charging system to switch the service class (e.g. from '300' to '200') via the front-end API (116A) of the charging system (116).

The service provide platform (102) may transmit a notification to the prepaid subscriber (e.g. an SMS message to the mobile handset (106) of the subscriber) to confirm provisioning of the

network usage advance.

While the dedicated account (206) has a positive balance, the subscriber may continue to transact on the mobile telephone network (110), with such transactions being recorded against the dedicated account. In the case of the advance of a particular category of mobile telephone network utilisation, only that category of network utilisation may be permitted and while the corresponding dedicated account (206) has a positive balance.

At some stage, a top-up or other injection of funds may be initiated by or on behalf of the relevant subscriber. This may be effected by way of an airtime recharge of any type (e.g. scratch card, electronic recharge, etc.) or by other methods (e.g. person-to-person (p2p) monetary transfers among subscribers or the like).

The MNO platform (104) may receive (314) a top-up notification including the subscriber identifier and a third amount, being a top-up amount by which the balance of the main account (204) associated with the subscriber is to be increased. The notification may be generated by the MNO platform (104) in response to receiving a recharge voucher from the mobile handset (106) of the subscriber or may be in the form of a notification relating to an electronic recharge, p2p monetary transfer or the like.

The charging system (116) may provision (316) the third amount (e.g. a top-up amount of USD12) to the main account (204). Provisioning of the third amount to the main account (204) may have the effect of increasing the balance of the main account by the third amount (e.g. equivalent to a credit operation), thereby effecting partial or complete recovery of the second amount, as the case may be. Complete recovery of the second amount may be effected if the third amount is greater than or equal to the first amount while partial recovery of the second amount may be effected if the third amount is less than the first amount. Partial or complete recovery of the second amount may thus be effected immediately in response to provisioning the third amount to the main account (204). In some cases, this recovery may be effected without knowledge or intervention of the service provider platform.

The IN (114) may then perform call detail record (CDR) operations or adjustments. CDRs may be used to capture usage information summaries for the subscribers and may facilitate the determination of a subscriber's eligibility for mobile telephone network usage advances based on the usage accumulated, the last time the subscriber used the mobile telephone network, active

period of the subscriber and the like.

The adjusted CDRs may be shared with the service provider platform (102) which may in turn updates its ledgers and accounts. The service provider platform (102) may then send a notification to the prepaid subscriber updating the subscriber on the status of the network usage advance (e.g. partially or completely recovered).

The following two tables illustrate exemplary operations for provisioning and recovery of a network usage advance according to aspects of the present disclosure. The first table illustrates partial recovery while the second table illustrates full recovery.

Example 1: Full recovery of the loan

Step	Description	Main Account (20% fee)	Service Class	Dedicated Account
0	Initial balance	0	100	0
1	Subscriber gets a loan advance of USD10 a. Change Service Class	0	**200**	0
	b. Adjust Main Account	**0 –10 –2 = -12**	200	0
	c. Change Service Class	-12	**100**	0
	d. Adjust Charging Account	-12	100	**0 +10 = 10**
2	Use of USD3 for a voice call	-12	100	**10 -3= 7**
3	Subscriber recharges with USD15	**-12 +15 = 3**	100	7

Example 2: Partial recovery followed by a full recovery of a loan

Step	Description	Main Account (20% fee)	Service Class	Dedicated Account
0	Initial balance	0	100	0
1	Subscriber gets a loan advance of USD10 a. Change Service Class	0	**200**	0
	b. Adjust Main Account	**0 – 10 – 2 = -12**	200	0
	c. Change Service Class	-12	**100**	0
	d. Adjust Charging Account	-12	100	**0 +10 = 10**
2	Use of USD3 for a voice call	-12	100	**10-3= 7**

3	Subscriber recharges with USD5 Partial recovery of USD5	**-12 +5 = -7**	100	7
4	Subscriber recharges with USD10 Full recovery of the remaining amount USD7	**-7 + 10 = 3**	100	7

Various components may be provided for implementing the method described above with reference to Figure 3. Figure 4 is a block diagram which illustrates exemplary components which may be provided by a system for the provision and recovery of network usage advances. The system may include a service provider platform (102). In some implementations, the service provider platform may be provided by an independent service provider providing network usage advance services or functionality to an MNO. In other implementations, however, the functionality of the service provider platform may be built into and or otherwise provided by an MNO platform, without the need for the services of an independent service provider.

The service provider platform (102) may include a processor (402) for executing the functions of components described below, which may be provided by hardware or by software units executing on the service provider platform (102). The software units may be stored in a memory component (404) and instructions may be provided to the processor (402) to carry out the functionality of the described components.

The service provider platform (102) may include a network usage advance request receiving component (406) arranged to receive a network usage advance request. The network usage advance request may include a subscriber identifier and a first amount associated with the network usage advance. The request may be received from a mobile handset of a subscriber or may be auto-generated by the service provider platform or MNO platform in response to certain predefine conditions being met (e.g. insufficient or low balance triggers).

The service provider platform (102) may include a balance control flag switching component (408) arranged to switch a balance control flag associated with the subscriber identifier from a first state to a second state. The balance control flag may be queried by the charging system when recording transactions against a main account associated with the subscriber. Transactions relating to a deduction from the main account after which the balance of the main account would be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state. The balance control flag may be implemented as

a service class in a charging system (e.g. as a column in a data structure of the charging system).

The service provider platform (102) may include a main account deducting component (410) which may be arranged to deduct a second amount associated with the first amount from the main account associated with the subscriber identifier while the balance control flag is in the second state.

The service provider platform (102) may include a dedicated account provisioning component (412) arranged to provision the first amount to a dedicated account associated with the subscriber identifier. Further transactions associated with usage of the mobile telephone network by the subscriber may be recorded against the dedicated account while it has a positive balance. In the case of the dedicated account being associated with a particular category of utilisation of the mobile telephone network, only deductions in respect of that category of utilisation may be recorded against the dedicated account.

Aspects of the present disclosure describe the provisioning of a new charging account (termed a dedicated account) which receives a loan amount associated with a network usage advance. A new service class may be provisioned to enable adjustment of a main account with a negative value. The service class may be set temporarily in order to adjust the main account, after which it will be reverted to its previous state. The main account may be configured so that no other service is able to adjust it when it contains a negative balance.

In an exemplary provisioning flow, a subscriber requests a loan from the service provider platform of X amount. The service provider platform inquires the IN for balances and an IN profile. The main account has a balance of Y amount. Any outstanding main account balance (Y) may be transferred to a loan account or any other charging account. The service provider platform runs eligibility checks to decide whether the user can obtain the loan. The service provider platform performs the following requests to the IN to advance the loan: changes the service class to allow main account to be set to a negative value; sets the main account to the negative value –(X+Z), where X is the loan amount and Z is fees; changes the service class back to default value; the loan amount X with the main account balance Y, i.e. (X+Y), is credited to the dedicated account. The service provider platform sends an SMS notification to the subscriber for the provision of the loan.

In an exemplary recovery flow, a subscriber either makes a recharge of any type (scratch card,

electronic recharge etc.) or the main balance is increased by other methods (e.g. p2p monetary transfers among subscribers). In any case, the amount Y is added to the main account. If recharge amount Y is larger than the negative balance of the main account the addition will render the main account positive and the loan fully repaid. If recharge amount Y is less than the negative balance of the main account the addition will leave the main account in negative balance and the loan will be partially repaid. The IN generates adjustment CDRs and transmits these to the service provider platform. The service provider platform receives the adjustments CDRs and updates its ledger accounts. The service provider platform sends an SMS notification to the subscriber for the provision of the loan.

Aspects of the present disclosure describe a negative balance method in which the main account of the subscriber is adjusted to a negative value when the loan is advanced. By setting the main account to a negative value, the account cannot not be used for any other service charges and upon recharge the loan is automatically recovered. So, the process or recovery starts at the advance. When the subscriber recharges, the amount is added to the main account. If the recharge amount is large enough to render the main account positive, the loan will be fully repaid.

The term "airtime advance" may include any on-credit provisioning of airtime made in favour of a prepaid mobile subscriber account so as to increase a balance of the account associated with the subscriber (the main account) and allow the subscriber to transact on the mobile telephone network. An "airtime advance" may be a loan of an amount of airtime made to the subscriber by an MNO or other service provider and which the subscriber is obliged pay back at a later stage (in some cases along with a fee).

Similarly, the term "mobile bundle advance" may include the on-credit (i.e. ahead of payment) provisioning of a usage limit in respect of one or more categories of mobile telephone network utilisation to a prepaid subscriber. In particular, "mobile bundle advance" may include the on-credit provisioning of a usage limit in respect of one or more categories of mobile telephone network utilisation for pre-paid (as opposed to post-paid or contract) subscribers. Exemplary categories of utilisation may include sending SMS messages, transmitting and receiving data messages and making voice calls. The usage limit associated with each category of utilisation may for example be a number of SMS messages, an amount of data (e.g. in bytes) and a number of minutes for which voice calls may be made.

Figure 5 illustrates an example of a computing device (500) in which various aspects of the

disclosure may be implemented. The computing device (500) 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 (500) 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 (500) to facilitate the functions described herein. The computing device (500) may include subsystems or components interconnected via a communication infrastructure (505) (for example, a communications bus, a network, etc.). The computing device (500) may include one or more processors (510) and at least one memory component in the form of computer-readable media. The one or more processors (510) 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 (500) 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 (515), 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 (515) including operating system software. The memory components may also include secondary memory (520). The secondary memory (520) may include a fixed disk (521), such as a hard disk drive, and, optionally, one or more storage interfaces (522) for interfacing with storage components (523), 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 (500) may include an external communications interface (530) for

operation of the computing device (500) in a networked environment enabling transfer of data between multiple computing devices (500) and/or the Internet. Data transferred via the external communications interface (530) may be in the form of signals, which may be electronic, electromagnetic, optical, radio, or other types of signal. The external communications interface (530) may enable communication of data between the computing device (500) and other computing devices including servers and external storage facilities. Web services may be accessible by and/or from the computing device (500) via the communications interface (530).

The external communications interface (530) 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 external communications interface (530) may include a subscriber identity module (SIM) in the form of an integrated circuit that stores an international mobile subscriber identity and the related key used to identify and authenticate a subscriber using the computing device (500). One or more subscriber identity modules may be removable from or embedded in the computing device (500).

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 (510). A computer program product may be provided by a non-transient computer-readable medium, or may be provided via a signal or other transient means via the communications interface (530).

Interconnection via the communication infrastructure (505) allows the one or more processors (510) 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 (500) either directly or via an I/O controller (535). One or more displays (545) (which may be touch-sensitive displays) may be coupled to or integrally formed with the computing device (500) via a display (545) or video adapter (540).

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. In one embodiment, a software unit is implemented with a computer program product comprising a non-transient 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.

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, which is set forth in the following claims. Finally, throughout the specification and claims unless the contents 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:

receiving a network usage advance request, the network usage advance request including a subscriber identifier and a first amount associated with a network usage, wherein a network usage advance enables network usage in advance of received payment;

switching a balance control flag associated with the subscriber identifier from a first state to a second state, wherein the balance control flag is queried by a charging system of a mobile telephone network when recording transactions against a main account associated with the subscriber identifier, the transactions being associated with usage of the mobile telephone network by a subscriber associated with the subscriber identifier, and wherein transactions relating to a deduction from the main account after which a balance of the main account would be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state;

while the balance control flag is in the second state, deducting a second amount associated with the first amount from the main account associated with the subscriber identifier; and,

provisioning the first amount to a dedicated account associated with the subscriber identifier, wherein further transactions associated with usage of the mobile telephone network by the subscriber are recorded against the dedicated account.

2. The method as claimed in claim 1, including switching the balance control flag from the second state to the first state, wherein switching the balance control flag from the second state to the first state is immediately in response to deducting or provisioning.

3. The method as claimed in any one of the preceding claims, wherein switching the balance control flag is associated with permissions, and wherein the method includes satisfying permissions prior to switching the balance control flag.

4. The method as claimed in any one of the preceding claims, wherein the method is conducted at a service provider platform, and wherein the service provider platform interfaces with an intelligent network (IN) of the mobile telephone network to switch the balance control flag and adjust the main account and dedicated account balances.

5. The method as claimed in any one of claims 1 to 3, wherein the method is conducted at a

network node of an intelligent network (IN) of the mobile telephone network.

6. The method as claimed in claim 5, including:

receiving a top-up notification including a subscriber identifier and a third amount, wherein the third amount is a top-up amount by which the balance of the main account associated with the subscriber is to be increased; and,

provisioning the third amount to the main account to effect partial or complete recovery of the second amount.

7. The method as claimed in claim 6, wherein complete recovery of the second amount is effected if the third amount is greater than or equal to the first amount, wherein partial recovery of the second amount is effected if the third amount is less than the first amount, and wherein partial or complete recovery of the second amount is effected immediately in response to provisioning the third amount to the main account.

8. The method as claimed in any one of the preceding claims, including, if upon receiving the network usage advance request the balance of the main account is positive, transferring a fourth amount corresponding to the positive balance of the main account to the dedicated account, and wherein transferring the fourth amount to the dedicated account is prior to deducting the second amount from the main account.

9. The method as claimed in any one of the preceding claims, wherein the network usage advance request is received from a mobile handset associated with the subscriber identifier, wherein the network usage advance request is received via one of: a short messaging service (SMS) message, an unstructured supplementary service data (USSD) message or an interactive voice response (IVR) message.

10. The method as claimed in any one of the preceding claims, wherein the network usage advance request relates to a request for an amount of airtime in advance, wherein the first amount is the amount of airtime to be advanced and wherein the second amount is a monetary value associated with the amount of airtime and optionally includes a fee.

11. The method as claimed in any one of claims 1 to 9, wherein the network usage advance request relates to a request for a particular category of mobile telephone network utilisation, wherein the first amount is a usage limit in respect of the particular category of mobile telephone

network utilisation, and wherein the second amount is a monetary value associated with the usage limit and optionally includes a fee, wherein the particular category of mobile telephone network utilisation is one of: an SMS bundle advance request; a data bundle advance request; and, a voice minutes bundle advance request, and wherein the usage limit is one of: a number of SMS messages which may be transmitted from a mobile handset associated with the subscriber identifier; a number of bytes which may be exchanged between the mobile handset and a data communication network; and, a duration of telephone calls that may be initiated from the mobile handset.

12. The method as claimed in any one of the preceding claims, wherein the balance control flag is implemented as a service class associated with the subscriber identifier, and wherein the method includes provisioning a new service class associated with the second state.

13. A system comprising:

a processor and a memory configured to provide computer program instructions to the processor to execute functions of components;

a network usage advance request receiving component for receiving a network usage advance request, the network usage advance request including a subscriber identifier and a first amount associated with a network usage advance, wherein a network usage advance enables network usage in advance of received payment;

a balance control flag switching component for switching a balance control flag associated with the subscriber identifier from a first state to a second state, wherein the balance control flag is queried by a charging system of a mobile telephone network when recording transactions against a main account associated with the subscriber identifier, the transactions being associated with usage of the mobile telephone network by a subscriber associated with the subscriber identifier, and wherein transactions relating to a deduction from the main account after which a balance of the main account would be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state;

a main account deducting component for, while the balance control flag is in the second state, deducting a second amount associated with the first amount from the main account associated with the subscriber identifier; and,

a dedicated account provisioning component for provisioning the first amount to a dedicated account associated with the subscriber identifier, wherein further transactions associated with usage of the mobile telephone network by the subscriber are recorded against the dedicated account.

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

receiving a network usage advance request, the network usage advance request including a subscriber identifier and a first amount associated with a network usage advance, wherein a network usage advance enables network usage in advance of received payment;

switching a balance control flag associated with the subscriber identifier from a first state to a second state, wherein the balance control flag is queried by a charging system of a mobile telephone network when recording transactions against a main account associated with the subscriber identifier, the transactions being associated with usage of the mobile telephone network by a subscriber associated with the subscriber identifier, and wherein transactions relating to a deduction from the main account after which a balance of the main account would be negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state;

while the balance control flag is in the second state, deducting a second amount associated with the first amount from the main account associated with the subscriber identifier; and,

provisioning the first amount to a dedicated account associated with the subscriber identifier, wherein further transactions associated with usage of the mobile telephone network by the subscriber are recorded against the dedicated account.

ABSTRACT

A system and method for provision and recovery of network usage advances are described. In a method, a network usage advance request, including a subscriber identifier and a first amount associated with the advance, is received. A balance control flag associated with the subscriber identifier is switched from a first state to a second state. Transactions relating to a deduction from a main account leaving a balance of the main account as negative are prohibited when the balance control flag is in the first state and permitted when the balance control flag is in the second state. While the balance control flag is in the second state, a second amount associated with the first amount is deducted from the main account associated with the subscriber identifier. The first amount is provisioned to a dedicated account associated with the subscriber identifier, with further transactions being recorded against the dedicated account.

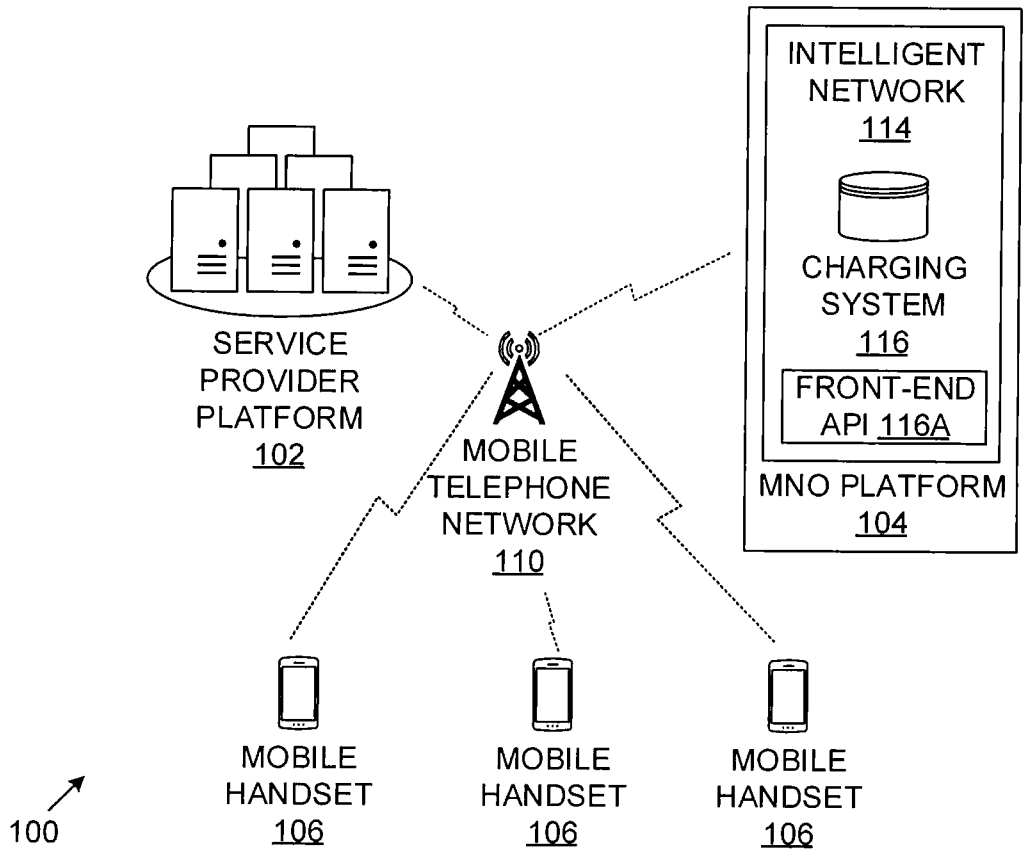

FIGURE 1

SUBSCRIBER IDENTIFIER 202	MAIN ACCOUNT 204	DEDICATED ACCOUNT 1 206	DEDICATED ACCOUNT 2 208	SERVICE CLASS 210
+27123456789	10	0	0	200
+27123456780	-5	6	0	200
+27123456781	2	0	100	200

200

FIGURE 2

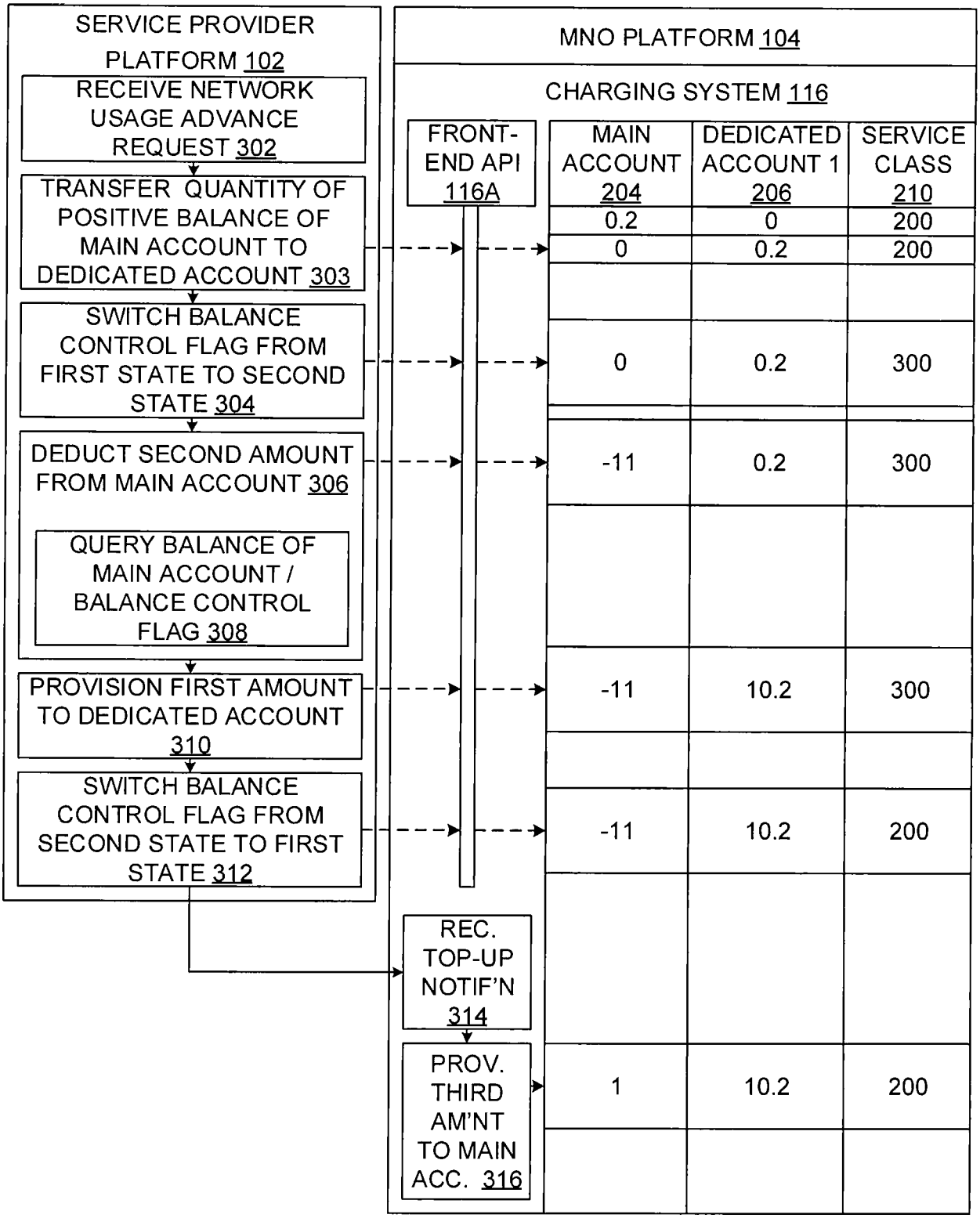
SERVICE PROVIDER PLATFORM 102
RECEIVE NETWORK USAGE ADVANCE REQUEST 302
TRANSFER QUANTITY OF POSITIVE BALANCE OF MAIN ACCOUNT TO DEDICATED ACCOUNT 303
SWITCH BALANCE CONTROL FLAG FROM FIRST STATE TO SECOND STATE 304
DEDUCT SECOND AMOUNT FROM MAIN ACCOUNT 306
QUERY BALANCE OF MAIN ACCOUNT / BALANCE CONTROL FLAG 308
PROVISION FIRST AMOUNT TO DEDICATED ACCOUNT 310
SWITCH BALANCE CONTROL FLAG FROM SECOND STATE TO FIRST STATE 312
REC. TOP-UP NOTIF'N 314
PROV. THIRD AM'NT TO MAIN ACC. 316
MNO PLATFORM 104
CHARGING SYSTEM 116
FRONT-END API 116A
MAIN ACCOUNT 204
DEDICATED ACCOUNT 1 206
SERVICE CLASS 210
0.2 0 200
0 0.2 200
0 0.2 300
-11 0.2 300
-11 10.2 300
-11 10.2 200
1 10.2 200

FIGURE 3

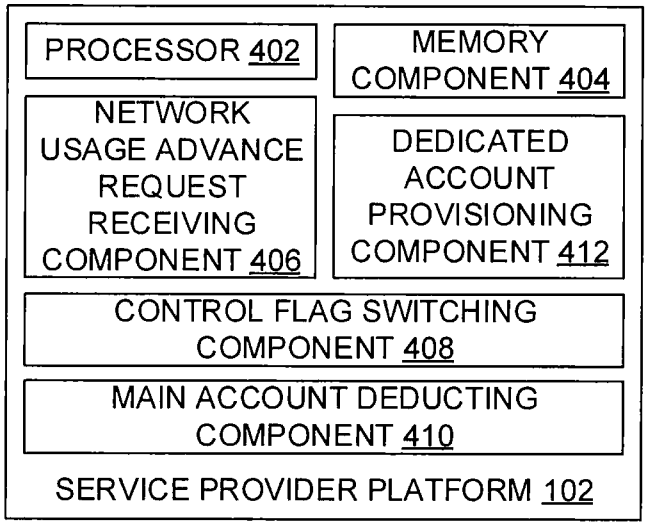

FIGURE 4

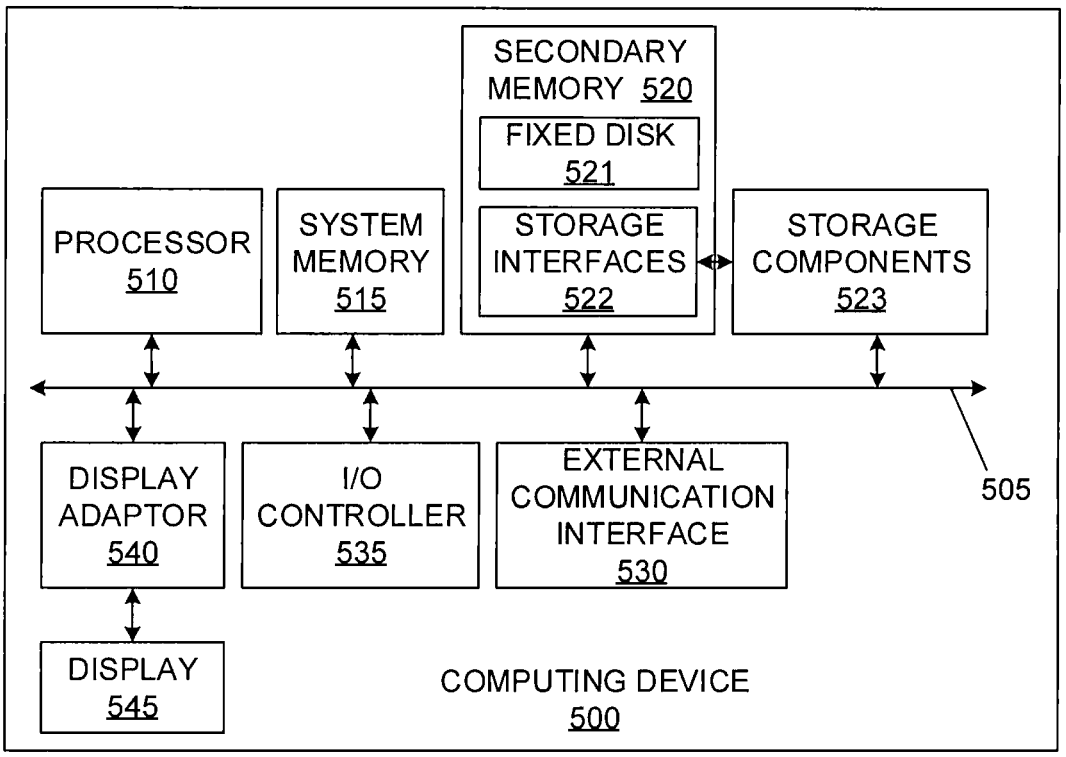

FIGURE 5