



# PATENT SPECIFICATION

(11) S84597

(21) Application No. S2005/0407

(22) Date of Filing of Application: 16/06/2005

(30) Priority Data:

(31) 04102816.8      (32) 18/06/2004      (33) European Union (EU)

(45) Specification Published: 30 May 2007

(51)      Int. Cl. (2006)  
          **G06F 17/60**  
          **G06F 19/00**

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(54) Title:                      An electronic payment system for providing regular payment services for pre-paid mobile phones

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S84597  
050401

**Title**

An electronic payment system for providing regular payment services for pre-paid mobile phones.

**5 Field of the Invention**

The present invention relates to mobile phones or other wireless telecommunication devices and in preferred embodiments includes a pattern identifier and risk analysis system and methodology. The invention particularly relates to a system and methodology that is adapted to interface with a telecommunication network infrastructure so as to determine the activity of a user operating a wireless communications device within the context of the network. The present invention more particularly relates to technical networking systems, data acquisition, software and data transfer, and processing systems, payment processing systems, and other network infrastructure components that combine to provide a system for monitoring wireless communications device operational characteristics and user behaviour so as to obtain increased amounts of data relating to usage by that user. This information can be used for a variety of purposes including in one preferred application, means for providing a more accurate determination of a cost of a regular subscription-based wireless service for the device and to enable a user to more easily avail of the regular subscription-based wireless service and to subsequently charge and process payment for the regular subscription-based wireless service cost. In another preferred application, the ability to monitor device usage allows the system to copy at appropriate times the software and data from a user's mobile device across the network to a safe storage area for restoration in the event of a loss of such data and software as part of the process of fulfilling an insurance claim. In this case the system will also be able to alter the insurance premium to reflect the extra claim fulfilment capabilities being provided. The invention also relates to a system and method adapted to enable a user of a mobile device who subscribes to a telecommunication network in a pre-paid manner to acquire and benefit from mobile phone insurance, in either a constant or selective manner.

## Background

5           Within a mobile telecommunication network subscribers can be divided into two main classes: post-paid where their usage of the network and services provided through the network is aggregated and billed to the user at the end of a billing period and pre-paid where the users put a certain amount of funds onto an account and their usage of the network decrements from that account. The  
10       latter class of user adds funds to their account ("tops-up" their account) in an irregular fashion. Although it is easy to provide telecoms services for such users where in the case where there are insufficient funds the user cannot use the network, it is not so easy to provide subscription-based ancillary services. In a post paid environment the possibility of using the mobile phone to pay for such  
15       subscription-based ancillary services which may include non telecom specific services such as news alerts, ringtones subscriptions, and insurance are possible. In a pre-paid environment this is difficult as the amount of the cost may not be known until the service is availed of and often is calculated on a time interval, such as a cost per month. It is also impossible to know with  
20       certainty whether the pre-paid user will have sufficient funds in the credit account to pay for subscription-based ancillary services when the recurring regular payment for such services becomes due.

          The concept of insurance is well known. In return for payment of a  
25       premium, a user is then covered against certain activities and/or incidents. Insurance has applications in many fields such as personal liability and also in the protection of certain possessions against loss/theft or damage. Typically a user is assessed on the basis of certain actuarial parameters or sectors and an appropriate charge is then calculated for that user. This usually requires the  
30       allocation of the user to a certain risk category class and the insurance premium appropriate to that class is calculated for the users within the class. This is well known and relatively simple to implement in the case of for example health

insurance or the like but is more difficult to assess for other devices for which risk may fluctuate depending on usage. Such devices include mobile communications devices. Within the present invention the terms mobile communication device, wireless device or mobile device is intended to cover mobile or wireless telephones, personal digital assistants (PDA's), mobile gaming devices, and the like, where the devices have the ability to communicate in some way through a wireless communications network.

Conventional methods for determining costs, charging, and processing payment of wireless device insurance to date have been limited to very basic techniques. Cost determination systems are virtually non-existent with the result that effectively the same amount is charged to all device users that have selected insurance, with the only differentiation in some cases being according to the type of device. Known methods of charging and payment include through the bills of users that are "post paid" subscribers to the mobile communications network, who then may pay through a direct debit or cash payment. The payment is for charges already incurred. In a "post paid" implementation, if the user wishes to avail of insurance for their device, the user is initially classified within a specific insurance risk grouping and an appropriate tariff is calculated for that user. The tariff can then be paid in a once off initial payment or alternatively split between the regular invoices that the user has agreed to pay as part of their contract. This type of contract is contrary to the basis for many people's use of a "pre-paid" subscription plan i.e. they don't wish to have any type of regular outgoings that they are not in control of.

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In a "pre paid" environment the user does not enter into a contract for a specified period with a mobile operator. Instead, the payments made by the user are in anticipation of charges, i.e. a balance is purchased and associated with the mobile device of the user and subsequent use decrements that balance. In practice, the user purchases a mobile device and through for example the purchase and use of "top-up" cards or the like can provide their device with credit to enable them to make calls and utilise other wireless

services. It will be appreciated that the “top-up” card example is only illustrative of the type of balance increment that may be used for a pre-paid billing system, and the term top-up within the present invention is meant to cover any technique that may be used to increment the account of a prepaid mobile phone user.

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The “top-up” cards are available in predefined value amounts and once a user has exhausted the credit provided by one “top-up” card it is then necessary to purchase an additional card and to repeat the credit process. The user therefore determines the frequency and place of purchase of these “top-up” cards. Such behaviour and use of “pre paid” mobile devices is very popular in certain sectors of the market; specifically in the youth sector of developed markets and in most developing markets. It is convenient for these sectors to adopt this type of mobile device subscription as they are in control of spending behaviour.

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It is however very difficult for the mobile operators to regulate and also to determine usage patterns. Despite the fact that these users have decided to adopt a certain type of mobile phone usage, it does not mean that their usage is any less susceptible to the factors for which the post-paid users obtain regular subscription-based wireless services. However, heretofore it has been difficult technically for a mobile operator to provide such users with the benefits of insurance or other regular subscription-based wireless services on their mobile devices as the behaviour and payment pattern of the user did not lend itself to such association, i.e. it is difficult to extract regular payments when users top-up irregularly. It is possible to obtain mobile communications device insurance through other insurance channels such as for example as part of a “home insurance” policy. However, this option may not be available to many users. It will also be appreciated that each user that insures their phone with one of the other insurance channels represents potential lost revenue to the mobile phone operator. There is therefore a need to provide a system and method that enables users of “pre paid” mobile devices to easily avail of insurance for their

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activities or indeed for other mobile subscription-based services that would traditionally require regular payments using the device.

5 A further problem specific to existing wireless device insurance cost determination systems is that the calculated costs often bear little relevance to the likelihood of a claim subsequently occurring. As mentioned above, rating systems within the context of insurance are known, and the use of mobile devices to transmit information indicative of user patterns is also known. Such an example is US6064970 which describes a method and system of  
10 determining a cost of automobile insurance based upon monitoring, recording and communicating data representative of operator and vehicle driving characteristics. The cost is adjustable retrospectively and can be prospectively set by relating the driving characteristics to predetermined safety standards. The method comprises steps of monitoring a plurality of raw data elements  
15 representative of an operating state of the vehicle or an action of the operator. This data can then be transmitted to a central data processing server where it may be used to assess a correct rating for that automobile user. When the insurance premium is next up for renewal, the tariff payable will be based on the actual historical data related to that specific user.

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Another example of such monitoring of user behaviour is described in US6502020. This specification describes an ongoing driving habit monitoring system used by insurance companies to more accurately determine the driving habits of their policyholders or authorized drivers in order to more correctly  
25 estimate their risk of loss. The system uses a monitoring device located in the insured party's motor vehicle. Each monitoring device is coupled to a GPS receiver, that provides physical location information, and to a wireless modem capable of connecting to a wireless communication network. The system also includes a central computer connected to a wide area network that is able to  
30 continuously or intermittently receive movement information from the monitoring device as it travels in a specific region covered by the wireless communication network. The central computer uses a driving monitoring software program and

several ancillary databases containing roadway information for a region, route information, and traffic pattern information. Insurance companies or other authorized users of the system are able to log onto the central computer to the information in the database.

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A further example of insurance systems is US patent application US20030033173 of Suzuki et al. In this application a portable telephone is used to control the activation and duration of specific insurance policies specifically travel insurance. A specific type of portable telephone is required, which is  
10 modified in order to ease the communication between the mobile user and the computer systems of the insurer. When a user wishes to activate their insurance they use the specific buttons provided on their modified portable telephone to effect the communication link. When they wish to terminate the insurance they can similarly communicate this desire to the computer network.  
15 The benefit of this application lies in the portable telephone controlling the duration of the insurance cover, which can lead to reduced costs for the user. The telephone can also communicate periodically position and distance related information pertinent to the user to the insurance computer thereby enabling a modification of the premium. This system is beneficial in that insurance is  
20 related to the activity of the user but for billing purposes requires information about the user, as a tariff is calculated and then dispatched to the user in the usual manner. It is therefore not suitable for mobile phone insurance where the user utilises a pre-paid system, as in such systems the user is to all effect anonymous to the system. It also requires a specific type of portable telephone  
25 modified so as to enable the communication. This is both cumbersome and difficult to provide to all users. It is also a push from the user as to their information as opposed to the network monitoring their usage pattern independently of the user.

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Although both US6064970 and US6502020 describe the use of a portable telephones to transmit information, such use is no more than the intended purpose and application of such telephones. Similarly US2003/0033173 albeit

using a portable telephone to control the insurance, cannot be used on all mobile devices as it requires specific hardware modifications.

In the context of mobile devices themselves, however, current rating systems, in the sense of those employed for other types of insurances e.g. motor vehicle insurance rating systems, are virtually non-existent. Conventional systems cannot collate data that reliably predicts the manner or safety of future operation of the wireless device so as to determine a premium specific to that user for their mobile device insurance. The absence of accumulated relevant data for computation of a fair cost of wireless device insurance has a necessity for an improved system for more reliably and accurately accumulating data having a highly relevant evidential value towards predicting the actual manner of a wireless device's future operation. Heretofore it has not been possible to accurately accumulate and assess the risk profile of a user based on that user's behaviour and activities. There is therefore a technical requirement for a system that can provide information on the activity and usage of a wireless device and further for a system that can utilise that information for risk analysis and assessments. There is a further requirement for a system that can enable a calculation of an appropriate insurance tariff for a user and bill that user appropriate to their usage of their mobile device and risk of potential claim. There is a yet a further requirement for a system and methodology that enables the provision and billing of additional services, such as mobile phone insurance, to those users that use pre-paid subscription plans and are otherwise anonymous to the mobile network operators (MNOs).

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In a pre-paid environment the top-up process is one that occurs over a constrained time period of up to 20 seconds. Many of these top-up operations are carried out simultaneously by network users on a continuous basis from the operator's perspective. Therefore, heretofore it has not possible to provide services that require a varying calculation of tariff to such pre-paid customers. The technical constraints in deducting the correct tariff for a user at top-up, allocating that to their account and doing that within the time allowed for the top-

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up are such that there is the possibility that the provision of such services would cause a breakdown of the time-critical top-up process because of too great a strain being imposed on the operator's pre-paid billing system. A further problem with existing wireless device insurance provision systems is that in the event of loss of / damage to a user's device, the claim fulfilment process often only provides the user with a replacement handset. However, a significant element of the value to a user of a modern wireless device derives from the software and data that resides on the device. This software and data is constantly added to and altered by the subscriber through the use of data-related services e.g. sending / receiving messages; downloading software applications such as programs, ringtones, and logos; storing data on software applications that reside on the device such as personal organisation data; storing contact details. Other such software and data will be familiar to a person skilled in the art. The restricted nature of data restoration services in the context of existing mobile device insurance claim fulfilment processes creates a further requirement for a system that will both monitor the usage of the device by the subscriber and in the event of loss or destruction of the device enable the user to load the data that was present on the previous device on the new device.

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### **Summary**

The present invention provides a system and method that enables a prepaid mobile phone user to avail of regular subscription-based wireless services for their mobile device. The system is particularly adapted to tailor the payment for the regular subscription-based wireless service based on the irregularity of top up requests made by a pre-paid user within the prescribed mobile network.

The invention also provides a system and method that can determine a risk analysis and thereafter an appropriate tariff for a wireless communications device operator based upon monitoring, recording and communicating data representative of operator and device operation characteristics, whereby the

cost is adjustable according to operation characteristics data, and this adjustable cost is then used to define an appropriate tariff for deduction from the top-up request.

5           In accordance with a preferred embodiment of the present invention, a system and methodology are provided that enables a processing, charging and payment for the cost of wireless communications device regular subscription-based services through the billing systems already available to the subscriber.

10           The system of the present invention provides for a monitoring of a plurality of raw data elements representative of an operating state of a wireless communications device and action of the user. Selected ones of the plurality of raw data elements are recorded when they are determined to have an identified relationship to the payment patterns and insured risk associated with the  
15           device. The recorded elements are consolidated for processing and conversion into a premium rate and top-up payment amount for charging to the user. This system then charges the calculated deduction at top-up to the user and processes payment using the appropriate available billing systems.

20           In accordance with a further aspect of the present invention, the system comprises an apparatus for immediately communicating to a central insurance database, information representative of the insured risk of a handset based on the handset device operating state and user actions.

25           The present invention uses information acquired from the wireless communications device usage and operation to more accurately assess device usage and thereby derive insurance costs more precisely and fairly. Examples of possible actuarial classes developed from wireless communications device provided data include device type, time spent on voice / data calls, messaging  
30           patterns, time switched on/off, applications downloaded, areas of use, and frequency of usage. By providing for more specific actuarial classes the present invention provides for a better indication of loss because the actuarial classes

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are based on actual use of the wireless communications device and the behaviour demonstrated by the user. This will allow the consumers unprecedented control over the ultimate cost of their wireless communications device insurance.

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The present invention uses information acquired from the top-up payment pattern of the user to more accurately assess future top-up schedules and thereby derive top-up deductions for regular subscription-based wireless services more precisely and fairly.

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One of the main outputs of the present invention is a figure for each pre-paid user regarding what deduction needs to be made from the next top-up that they make. This figure is continuously calculated offline between top up requests on an incremental basis so that when the pre-paid user conducts a top-up operation the operator billing system only has to make one query during the top-up process to find out what deduction should be made at the current top-up, that amount having been calculated and then stored for subsequent retrieval.

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One benefit obtained by use of the present invention is a system that will provide precise and timely actuarial information about the current operation of an insured wireless communications device that will enable an accurate determination of operating characteristics, including such features as calls made, time and location of use. This actuarial information can be used to establish actual usage based insurance charges, eliminating rating errors that are prevalent in traditional systems and will result in wireless communications device insurance charges that can be directly controlled more effectively by individual subscribers.

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It is another benefit of the subject invention that conventional wireless communications device electronics are easily supplemented by system components to extract selected insurance relevant data from the device.

The invention has specific application in pre-paid subscription environments where a real time deduction of a tariff associated with the usage of the handset for a regular subscription-based wireless service can be made  
5 from a top up operation associated with that user so as to enable pre-paid users to avail of regular subscription-based services.

The present invention may also in certain embodiments use information acquired from the wireless communications device usage and operation to  
10 ascertain what software and data has been stored on the mobile device by the user. This present invention uses this usage information to copy this software and data from the user's mobile device across the mobile network to a back-up storage location at appropriate times, for example after the user has  
15 significantly altered the software and data residing on the device. The user will be given the option as to whether or not this service is provided. The invention then enables an adjustment of an insurance premium top-up deduction charge appropriately to reflect the extra cover being provided. Then, as part of the process of insurance claims fulfilment, the present invention copies this stored  
20 data from the back-up storage location to the user's replacement mobile device via the mobile network.

Accordingly the invention provides a network in accordance with claim 1. Advantageous embodiments are detailed in the dependent claims. The  
25 invention also provides a method according to claim 5.

Other benefits and advantages of the subject new wireless communications device insurance cost determination and payment process will become apparent to those skilled in the art upon a reading and understanding  
30 of the specification.

#### **Brief Description of the Drawings**

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The present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a schematic overview of the components of a wireless network incorporating a system of the present invention;

5 Figure 1A is a schematic showing a process for interfacing a payment module in accordance with the present invention with a mobile wireless network operator (MNO) billing system;

Figure 1B is a schematic process flow showing a methodology by which a payment module in accordance with the present invention continuously  
10 calculates the initial top-up deduction due;

Figure 1C is a schematic showing how the next top up deduction amount should be calculated according to previous top-up history;

Figure 1D is a schematic illustrating the top up process;

Figure 2 is a flowchart generally describing the payment calculation and  
15 payment charging process for a wireless communications device that is connected to the network using a prepaid subscription plan;

Figure 2A is an example of the screen display of a mobile device that will be provided for two steps of the sequence flow of Figure 2;

Figure 3 is a flowchart describing the recording of usage-based data  
20 pertinent to usage of the wireless communications device and the use of this data in relation to wireless handset insurance cost and cover determination;

Figure 4 is a flowchart describing the recording of location-based data pertinent to usage of the wireless communications device and the use of this  
data in relation to wireless handset insurance cost and cover determination;

25 Figure 5 is a flowchart generally describing the premium calculation and payment charging process for a wireless communications device that is connected to the network using a post-paid subscription plan;

Figure 6 is a flowchart generally describing the process whereby, based on monitoring usage data, the system copies the software and data from the user's  
30 device across the mobile network to a back-up storage location at appropriate times; and

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Figure 7 is a flowchart generally describing the process whereby during the claims fulfilment process the software and data from the user's lost / damaged device which has been stored in a back-up location is restored to the user's replacement device through transfer across the mobile network.

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### **Detailed Description of the Drawings**

The invention will now be described with reference to the following drawings.

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Figure 1 shows, in a very simplified schematic form, a mobile network. Two or more users having mobile devices 100a, 100b, may communicate with each other through wireless communication links or channels 110 provided by a mobile network operator 105. The mobile network operator (MNO) 105 maintains a database of subscribers to the system and only allows those users who are authorised to use the network to generate traffic within the network. The traffic generated by a user is monitored by the operator and is used for billing purposes. In the case of a post paid account, the traffic over a predetermined time period, usually monthly, is monitored and the user is invoiced an appropriate amount for that traffic at the end of the month. If the user has also subscribed for insurance or another similar subscription based recurring service, an appropriate tariff is included in the invoice at the time of creation. It will be appreciated that the insurance or another similar subscription based recurring service tariff is not calculated at the time of usage of the network, and its value is not related to the volume or nature of the traffic.

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In the case of pre paid users, the user establishes an account with the network and subsequent traffic effects a decrement of the credit in that account. The account details are stored in a billing module 120 incorporated within the network, the billing module interfacing with components of the network that monitor traffic and activity within the network so that users can be appropriately billed. The user can continue to make calls as long as there is sufficient credit in

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their account, and once that credit is reduced it is necessary for the user to effect what is termed a "top-up", the addition of more credit to the account. The undertaking of a top-up operation typically involves the user purchasing an activation code for a specific value and transmitting that activation code in the form of a data message to the network. The network receives the message, associates the message with the account of that user, and adds the appropriate value to the account. Such operation will be well known to the person skilled in the art. It will be appreciated that the decrement of the account is specific to the volume of traffic- be it voice or data- generated by that user. Heretofore the top-up value was restricted to telecom type charging such as calls, data messages, ring-tones and the like.

The present invention provides for non-telecom type services, including ones that are subscription based and require recurring regular payments, and their associated charging to be provided to pre-paid users and will now be described with reference to an exemplary embodiment of that type non-telecom type service, that of insurance. In accordance with the present invention an additional set of hardware and software functionality, termed an insurance module 130, is interfaced with the billing module, so as to enable a user to avail of insurance for their mobile device. The insurance module (which can equivalently be thought of any regular payment module) of the present invention is advantageous in that it enables the insurance premium that is calculated for a specific user to be related to that specific user's activity within the network. Furthermore, as the insurance module is interfaced with the billing module of the MNO it represents a more efficient manner to pay for insurance for mobile devices, particularly in the case of pre paid subscribers. The insurance module 130 may also be adapted to provide a storage capacity, or indicate a location for a storage facility, which will contain software and data that has been backed-up from insurance subscribers' mobile devices across the mobile network. The insurance module may also contains a timing system adapted to decide an appropriate time to update the back-up copy of the user's device software and data based on the monitoring of device usage. In such instances of providing a

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back-up operation the insurance module may also provide functionality for enabling the restoration of a user's software and data to a new mobile device during the insurance claim fulfilment process. In a modification to such an embodiment the actual storage of the backup data may not be provided on the server(s) providing the insurance module but on an additional external data source provider. In such an instance the insurance module will simply include information as to where that data is stored so as to enable a seamless transfer of information between the mobile device and the network.

10 It will be appreciated that the regular payment module 130 of the present invention is an additional set of functionality that may be added to the existing network architecture of the mobile network operator (MNO) structure. Figure 1A shows in schematic form how such an interface is realised. In step 1, the payment module is integrated with the existing billing system. Such integration typically requires the use of common datastores such as registered customers etc and also establishes how traffic received at the network during a top up request is to be treated. In step 2, once the payment module is integrated the parameters need to be specified. The typical parameters include the definition of maximum and minimum amounts per time interval, possible top up amounts, % deduction levels for each top up and any possible adjustments that may be provided dependent on usage within the system. This would include references to the specification of maximum and minimum payment amounts per-top up, what the different top-up amounts can be, how to deal with customers who top-up infrequently, and specification of the time frame for applying maxima and minima (e.g. there is likely to be an annual max / min at the least – therefore need to apply this period to the initial application date for the project). There will also be a reference to the global average expected recurring revenue that the system would be expected to generate. This figure could either be an average per user or a global total and is used if necessary to alter future top-up deductions to ensure that the global expected recurring revenue is both achieved and not exceeded. There could also be a chart showing how a user is inputted onto the system for the first time and the specified parameters applied

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for the first top-up after sign-up to the system. These parameters are typically defined within the system within a storage location 150 and are accessible/modifiable by a user with administrator privileges. Once they are defined appropriately – and it will be appreciated that not all available parameters may  
5 need to be activated for each application, the module is now ready to accept subscribers (Step 3).

Figure 1B shows a typical customer registration process that may be provided for a new subscriber to the database. In step 1, a customer  
10 representative for the mobile network enters the customer details onto the payment module. Such data entry may be provided by the pulling of data automatically from relevant fields of the normal billing information datastore by the payment module or may require double entry of relevant information. Specific information of interest is the mobile device IMEI number, which it will be  
15 appreciated, is specific to each device. Any other device specific identification codes as used by the mobile operator could also be obtained and stored by the payment module. As the system of the present invention is directed towards device usage, it is important for that number to be retained and associated with a specific user. The IMEI number may be associated with one or more separate  
20 SIM cards, to cater for the fact that some users interchange their SIM cards depending on their usage. In the case of the present invention where the regular service provided is one for mobile device insurance, it is important to monitor the activity of the device irrespective of which network or SIM card is being used. As such the payment module may need to be configured to  
25 interface with the billing modules of two or more networks. Once the customer (subscriber/user) details are entered, they are then stored (Step 2).

The payment module then associates that user (as it is their first activity within the network) with standard pricing parameters (Step 3) according to the  
30 definition of those defined in the system establishment (Figure 1A). The module then defines a payment required for the next top up and stores that payment for retrieval at the time of the next top up. (Step 4)

In essence the output of this process will be a figure to be deducted at the next top-up for all potential top-up amounts. In cases where top-up amounts are infinitely variable then a percentage figure would be the output. The main part of this process is the application of time and amount based maxima and minima to the various potential top-up amounts that can be selected by the user. In the case where for example the following top-up amounts were available – 5, 10, 20, 40, 50 and the following max / min figures applied per top-up – Min 1 per top up, max 3 per top up – 10% of top-up amount applied then the output table for a user that is still within the annual max would be

Top-up Amount	Deduction Amount
5	1
10	1
20	2
40	3
50	3

Figure 1C shows an example of how the correct amount to be deducted is calculated in accordance with the invention. In Step 1, the prepaid customer interacts with the network to perform a top-up. As this is their first top-up request, the billing system of the MNO interfaces with the payment module of the invention and retrieves the standard initial stored deduction amount that has not been adapted based on historic usage and top-up patterns of the customer for this top up. This amount is deducted from the top-up request (Step 2). The payment module records that a top-up request has been conducted by the user (Step 3). The amount deducted for the subscribed service is then added to a datastore which stores the total amount deducted in a predefined time period (Step 4). In Step 5, the total amount deducted for the relevant payment period e.g. in the case of insurance usually the policy year to date is then compared with any relevant predefined maxima and minima levels. The standard amount due for each top up level is then calculated (Step 6), and this amount is

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adjusted based on the system rules and the total deductions and maxima and minima levels that were compared above – for example where the amount deducted in the time period is already the maximum amount to be deducted in this time period then no further deduction should be made in this time period (Step 7). The new amount is then stored for subsequent retrieval at the next top-up (Step 8). It will be understood that steps 3 to 8 occur after the top up request has been effected- i.e. the user is not waiting on the calculation for their request to be processed.

10 Figure 1D shows, in schematic form, the top-up deduction process. In step 1 the subscriber makes a top up request. The request is routed to the operator billing system (Step 2). The system interfaces with the payment module of the invention (Step 3). The amount to be deducted is read from its storage location and returned to the billing system (Step 4). This amount is then deducted from  
15 the top up request value (Step 5), and a suitable portion of the deducted amount is routed to the service provider providing the subscribed service (Step 6). The subscriber is then optionally informed of the deduction and the actual value of their request that will be incremented to the telecom account for normal telecoms activity –call charges and the like. The service provider, on receipt of  
20 the payment then continues to provide the service to the user (Step 7)

Figure 2 shows a methodology according to the present invention which is adapted to enable a pre paid user to avail of insurance through their pre-paid account. It will be appreciated in this context that insurance is an example of the  
25 type of regular subscription-based payment service that may be provided using the system of the present invention. The user requests a top up of the account in the form of a data request to the network, which is received at the network (Step 200). The data request may be of the form of a short form message to a specific number within the network or of another form, as will be appreciated by  
30 those skilled in the art, and therefore requires no hardware modification to the mobile device- see example of graphical interface in Figure 2A. On receipt of the request for a top-up, the network is adapted to ascertain whether that user

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is a subscriber to the available insurance policy (Step 205). This is typically achieved by checking an identifier associated with the mobile device request and specific to the mobile device, such as the device IMEI, with a datastore of users that are currently insurance subscribers or that have previously  
5 subscribed and are not currently covered. The details of insurance subscribers are storeable in the insurance payment module 130 previously described in Figure 1.

10 If it is determined that the request is from a user that has previously availed of the insurance, the user may then in certain embodiments of the invention be queried by the network whether they wish to use a portion of this top-up to continue their insurance (Step 210). Such a query may include a display on the screen of their mobile device (Figure 2A). If they answer in the affirmative, then a correct tariff level for that user is determined, based on their  
15 previous historical network usage (Step 215). The determination of the correct tariff is not a calculation of that tariff, the calculation having been conducted in the interval between this top up request and the previous top up request in an off line manner. Rather the determination is the retrieval of an already calculated amount provided and stored within the payment module and is  
20 effected by a query to a calculation engine (a sub-module of the payment module) which is storing the relevant amounts to be paid. At this point the user may also be queried as to whether they simply want cover for the replacement / repair of the mobile device only or if they also want cover relating to the loss of software and / or data that resides on the device.

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If the known user does not want insurance on this specific top up request then the total value of the top up request is routed to their account in the normal way (Step 225).

30 If as a result of the query of Step 205 it is ascertained that the user is not a previous subscriber to the system then the user is queried as to whether they wish to avail of insurance from this moment on (Step 220). If they answer in the

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negative then the total value of the top up request is routed to their account in the normal manner (Step 225). If they answer in the affirmative, then a database entry in the insurance module (130) is created for them (Step 230). A correct tariff level for that user, based on a default tariff level for all new users is  
5 then associated with that user as the correct tariff level for insurance (Step 235).

Once the correct tariff level for both new and already subscribed users is determined (Steps 215/235) then the value of the specific top up request is evaluated and either a fixed amount or a % value of that top-up request or a  
10 combination of fixed amount and % value of that top-up request is associated with a contribution towards the insurance (Step 240). The value determined for the contribution towards the insurance requires an analysis of the frequency of top-up requests effected by that user, as it will be appreciated that if a user tops  
15 up more regularly then the contribution taken from each top up request towards insurance will be less than for a user that tops up irregularly. Such analysis of the frequency of top-up requests made by a user requires a monitoring of the traffic within the network. The actual value will be related both to the tariff level for that specific user and also the value of the top-up. It will be appreciated that the contribution from the top up request to the insurance payment cannot  
20 normally be such as to dilute the top up value by so much as to not leave any value remaining for actual network usage. Tariff levels for specific users will typically be proportional to their regularity of top-up, which is related to their usage of their mobile device within the network.

25 The top up request is decremented by that determined fixed amount or % (Step 245), the remaining portion of the top up request is credited to their top up account in the normal manner (Step 250) and the user is informed that they are now covered by insurance (Step 255).

30 It will be appreciated that the system of the present invention is adapted to interface with existing tariff and billing modules associated with mobile telecommunication networks. The system of the present invention also has the

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capability to interface with the billing modules of multiple networks to cater for situations where a pre-paid subscriber is using more than one SIM card, and thereby potentially more than one network, with the same handset. To achieve this interoperability the system of the present invention is configured to store an identifier specific to a particular handset, for example its IMEI number, and associate that with one or more SIM cards. In this way irrespective of whether the user avails of a first or a second network, while using the same handset, the system will identify that usage. In accordance with the present invention the request for a top-up is not routed directly to the top-up database. Instead, the request is intercepted by an insurance module (130) provided by the system of the invention. Once the insurance is requested, the insurance module determines whether insurance cover is in place for this specific user. This requires the use of a look up table wherein a list of registered insurance subscribers are provided and against which incoming requests for top up may be assessed. If there is no match within this comparison step and the user requests insurance, then the table is updated to identify a new user. If insurance is not requested, either by an existing subscriber or by a user who has never subscribed, then the top up continues in the previous normal fashion.

The system of the present invention enables a modification of the appropriate tariff for users depending on their usage of their mobile device. It will be appreciated by those skilled in the art that if for example a device is used more frequently than one which is used less frequently that the chance of a claim being made against the insurance – either arising from loss, theft or breakage – will increase. The risk to the insurer is therefore greater. Heretofore it was not possible to include this risk analysis in the calculation of a correct tariff for individual users. Using the system of the present invention the network usage by a user is constantly analysed and the appropriate risk sector for that user updated based on their network behaviour. The insurance database and premium calculation engine will be continuously calculating the appropriate rate / amount to be charged based on data added incrementally to the database based on usage. Therefore, the premium charge rate / amount will be ready for

use as soon as the pre-paid user requests a top up. Figure 3 shows an example of how this is achieved using the system and methodology of the invention.

It will be appreciated by those skilled in the art that every interaction that a mobile device makes with a mobile telecommunications network is monitored by the network. These interactions can vary from the user routing a voice or data message through the network to another mobile device, to downloading services or simply to moving from cell to cell within the network. In accordance with the present invention each interaction is monitored by the network (Step 300) and details of specific predefined interactions are then routed to the insurance module (130) of the present invention (Step 305). The insurance module ascertains whether insurance has been selected for that particular user (Step 310) and if it has not processes the information no further (Step 315). If there is insurance in place for the user then the details of the transactions are noted (Step 320) and then converted into factors suitable for inputting to an actuarial or similar model (Step 325). Such an actuarial model is provided in an exposure database where appropriate tariffs depending on usage are maintained. The model receives the factors (Step 330) and updates the specific tariff schema for that particular user (Step 335). The next time that the user requests a continuation of their mobile device insurance the tariff that they pay will depend on their previous activity.

It will be appreciated that as the insurance calculation and provision module of the present invention is interfaced directly with the billing module of the telecommunications network that it may take advantage of the information that is provided to the network by the usage pattern of the user of the mobile device. Figure 4 shows an example of how the system of the present invention may be adapted to apply or discontinue insurance for a specific user depending on the activity of the user. The system is adapted to monitor the operation of the wireless device (Step 400) and to effect a recordal of the location where that device is being used (Step 405). Such monitoring and recordal may be effected using standard analysis of cell traffic as will be appreciated by the person skilled

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in the art, and as was described above with reference to Figure 3. By predefining one or more locations as non-permitted locations, then the usage pattern can be compared to the allowed usage pattern (Step 410). If usage is maintained within the permitted areas, then this may be communicated to the insurance module (130) (Step 415) so as to continue cover. Initially the database is queried to ascertain whether cover is still in place (Step 420). If it has been previously discontinued, then it is re-established (Step 425). If it is already in place, then this is continued (Step 430).

10           However, if usage is in an area not permitted within the defined parameters of the system, then a message to the insurance module is communicated to this effect (Step 435). Again the existence or otherwise of cover is assessed (Step 440). If cover is in place then it is denied from this period on (Step 445). If it is not in place then this fact is continued (Step 450).

15           Although of primary application for a pre-paid environment where an effective mobile device insurance charging and payment system was not previously available the system of the present invention also has application in the post-paid environment. To date, the insurance premium that a user has paid for their mobile device has little or no relevance to the usage of the specific user. This is a disadvantage both in the fact that careful users cannot be rewarded and also users whose activity put their chance of risk at a higher level cannot be identified and charged appropriately. Figure 5 shows how a system of the present invention may be interfaced within a post paid environment to calculate an appropriate insurance tariff based on the user activity within the network. In accordance with normal practice, user traffic over the network initiates the generation of an appropriate tariff for that traffic (Step 500). Details of the tariff are then routed to a insurance module (130) provided by the system of the present invention. The insurance module determines whether insurance cover is in place for this specific user (Step 505). This requires the use of a look up table wherein a list of registered insurance subscribers are provided and against which the details of this user are checked. It will be appreciated that

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such datastores of subscribed users already exist for post-paid customers but heretofore have never been accessed or interfaced directly by the telecommunications network on the basis of the network traffic generated by specific users. If there is no match within this comparison step, then there is no further interaction between the components provided by the present invention and the existing billing module of the network operator (Step 510).

If a match is determined, then the cover database module is adapted to determine whether a premium appropriate to this user has been generated (Step 515). If a premium has been calculated, then the appropriate premium is associated with that user and a premium database is updated (Step 520). If a premium is not calculated for this user, then an appropriate premium is calculated (Step 525) using a premium calculation module. The calculation of an appropriate premium requires an interface (Step 530) between the premium calculation module with an established exposure database, the exposure database including appropriate rules for effecting an appropriate premium for a user or class of users. Once the appropriate premium has been calculated then the calculated premium is routed to the premium database (Step 535). The calculated premiums are then incremented against the usual tariffs for that user and invoiced during the regular billing period. Both the premium calculation module and exposure database are located within the insurance module (130) provided by the system of the present invention

As detailed above, the system of the present invention may provide in certain preferred embodiments for a back up of data from the mobile devices of subscribers. Figure 6 shows an example of how a system of the present invention creates a back-up copy of the software and data stored on the user's mobile device for restoration in the event of an insurance claim arising from loss / damage to the device. As was described with reference to Figure 3 above, the present invention monitors and records the operation of the device by the user. Part of this process is the recordal of details of the transaction (Step 320). At this point the system checks to determine whether or not the software and / or

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data stored on the mobile device has been altered (Step 600). If there has been no alteration the system does not perform any back-up operations at this time (Step 605). If the software and / or data on the mobile has been altered then the system determines whether or not a back-up operation is needed at this time (Step 610). If the system determines that no back-up is needed then the system does not perform any back-up operations at this time (Step 615). The method for determining whether or not a back-up operation is needed could be based on a number of parameters including for example:

whether or not the user has paid for this insurance service in the past,  
10 the degree to which the software / data residing on the device has been altered based on monitoring the network traffic or activity conducted by the user.

Depending on bandwidth considerations if the alteration has been small  
15 the system may decide that it is inefficient to perform a back-up operation. If Step 610 determines that a back-up operation is needed then the system will transfer a copy of the software / data from the device to a back-up storage location in the insurance module (130) (Step 620). This "copy" of the software / data may not be an exact copy of the data – it may simply be details of the  
20 software / data or a compressed representation of the software / data in order to make the transfer and storage operation more efficient. The system will determine the optimal method for performing the back-up operation regarding the exact method used. Finally, after performing the back-up operation the system will adjust the premium calculation method for the relevant subscriber to  
25 reflect the extra degree of cover now being provided by the insurance system (Step 625).

Figure 7 shows how a system of the present invention uses the backed-up stored information about the software and data that was on a user's mobile  
30 device to replace lost software and data in the case of loss / damage to the device. This process will occur during the fulfilment of an insurance claim for loss / damage to a mobile device by the user. The user initially switches on the

replacement device that has been supplied by the insurance provider (Step 700). The user then sends a claim signal to the insurance module (130) (Step 705). This indicates to the insurance module that the user has been issued with a new device and that a claim is being fulfilled. The insurance module will then

5 search the back-up storage location to determine if backed-up information has been stored by the system during the period when the user was using the old device and was paying for insurance back-up services (Step 710). If there is no back-up information that has been stored for the user then the system does not perform any restoration of software / data (Step 715). If there is back-up

10 information that has been stored for the user then the system restores the relevant software and / or data to the replacement device across the mobile network (Step 720). The system will use the IMEI number and other identifiers to ensure that the data is being restored to the correct replacement device for security reasons. Hence the system requires a recordal of specific IMEI

15 numbers for each user's device and on disassociation of a first IMEI number with a user- for example if that device is lost or stolen, the association of a new IMEI number for that user and the transfer of data to that new IMEI number. In the case where the actual software / data to be replaced has been backed-up in its entirety then it is simply transferred back across the mobile network.

20 However, if the software / data was not stored in its entirety but details were stored then initially the software / data will be recreated on the insurance module by querying appropriate external systems to obtain the complete software / data. Then the complete software / data is transferred across the network and restored to the user's new device.

25

It will be appreciated that traditionally, a wireless communications device user is charged for insurance based upon statistical averages related to the insurer's loss experience with other users who own similar devices in a similar geographic area. The invention allows for the measure of the actual data while

30 the device is being used. Such data measurement will allow the device user to directly control his/her insurance costs by operating the device in a manner which he/she will know will evidence superior care of use and a minimal risk of

generation of an insurance claim. Examples of data which can be monitored and recorded include:

- Frequency of voice call usage
- Time of voice call usage
- 5 Frequency of text message usage
- Time of text message usage
- Value of items downloaded to phone
- Length of time for which phone is activated

10 The calculation of an appropriate tariff based on user activity may be used in a real time environment to effect an appropriate tariff for that user for their insurance. This may be added to either a post paid insurance account, for subsequent invoicing, or decremented from a top up request at the time of top up using the system of the present invention. As such the premium is more  
15 directly attributable to the usage of the device and can be tailored individually. Additionally the user may now avail of insurance through prepaid environments, something that heretofore was not possible.

It will be appreciated that the traditional form of mobile device insurance  
20 cover only provides a replacement device in the event of a claim from the user for loss / damage to their existing device. This invention allows for the creation of a system that also provides cover for the software and data that resides on the mobile device. This extra cover will be particularly appreciated as mobile devices become more complex and a progressively greater amount of the value  
25 derived from their use is based on the software and data stored on them.

The words comprises/comprising when used in this specification are to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers,  
30 steps, components or groups thereof.

## Claims

1. A mobile telecommunication network having a billing module with a regular payment service module associated therewith and being adapted to enable a mobile device user to avail of regular subscription-based payment services for their mobile device, the mobile device user being a pre-paid subscriber to the network, the network including:
- a) means for receiving a request for a top-up from the user,
  - b) means for determining whether the request is received from a user who is a subscriber to the regular payment service module,
  - c) on determining that the user is a subscriber to the regular payment service module, means for determining a correct tariff for the user, and
  - d) means for decrementing the correct tariff from the top-up request at the time of top-up request and to route the remaining portion of the top-up request to the billing module, and
- wherein the means for determining a correct tariff for the user effects a determination of the correct tariff based on the historical network usage by the user by continuously calculating the tariff to be charged based on usage based incremental data such that on receiving a request for a top-up the appropriate tariff has already been calculated and may be deducted from the request.
2. The network as claimed in claim 1 wherein the regular payment module is an insurance payment module and the regular payment service is an insurance service.
3. The network as claimed in any preceding claim wherein the means for determining a correct tariff for the specific user determines the tariff based on the user activity and top-up pattern history within the mobile network.
4. The network as claimed in any preceding claim being adapted to monitor the usage pattern of the mobile device and to determine when the user has added software and / or data to the device between system defined time intervals, the network being adapted to enable a transfer of a copy of at least

a portion of software and/or data stored on the user's mobile device to a back-up storage location.

5. A computer implemented method of providing mobile device insurance to a pre-paid subscriber to a mobile network, the method including the steps of:
- a) establishing on the network a database of subscribers to insurance,
  - b) monitoring requests for top-ups from subscribers to the network,
  - c) establishing whether the requests for top-ups are received from subscribers to insurance,
  - 10 d) determining a correct tariff for insurance for a subscribed user by continuously monitoring incremental data based on user activity within the network such that at the time of receiving a request for a top-up, the correct tariff for a user has already been calculated,
  - e) decrementing the top-up request by the correct tariff, and
  - 15 f) balancing the remainder of the top-up request to an existing telecommunication account for that user.

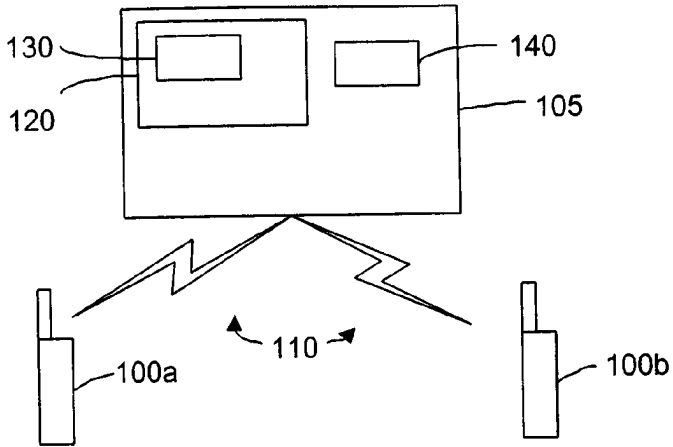


Figure 1

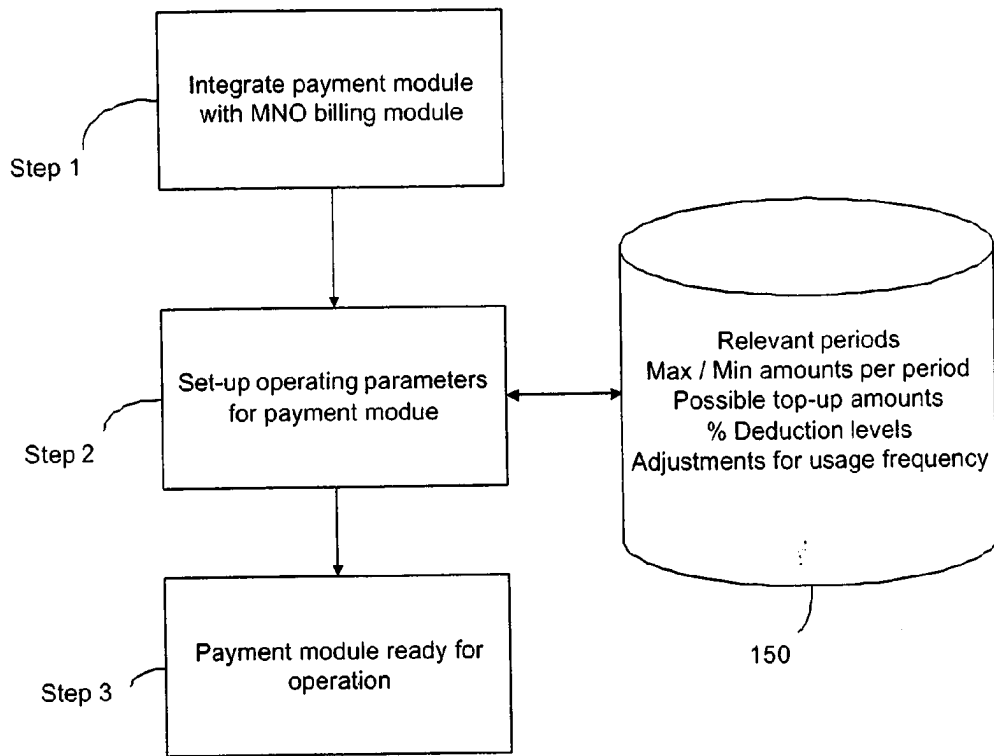


Figure 1A

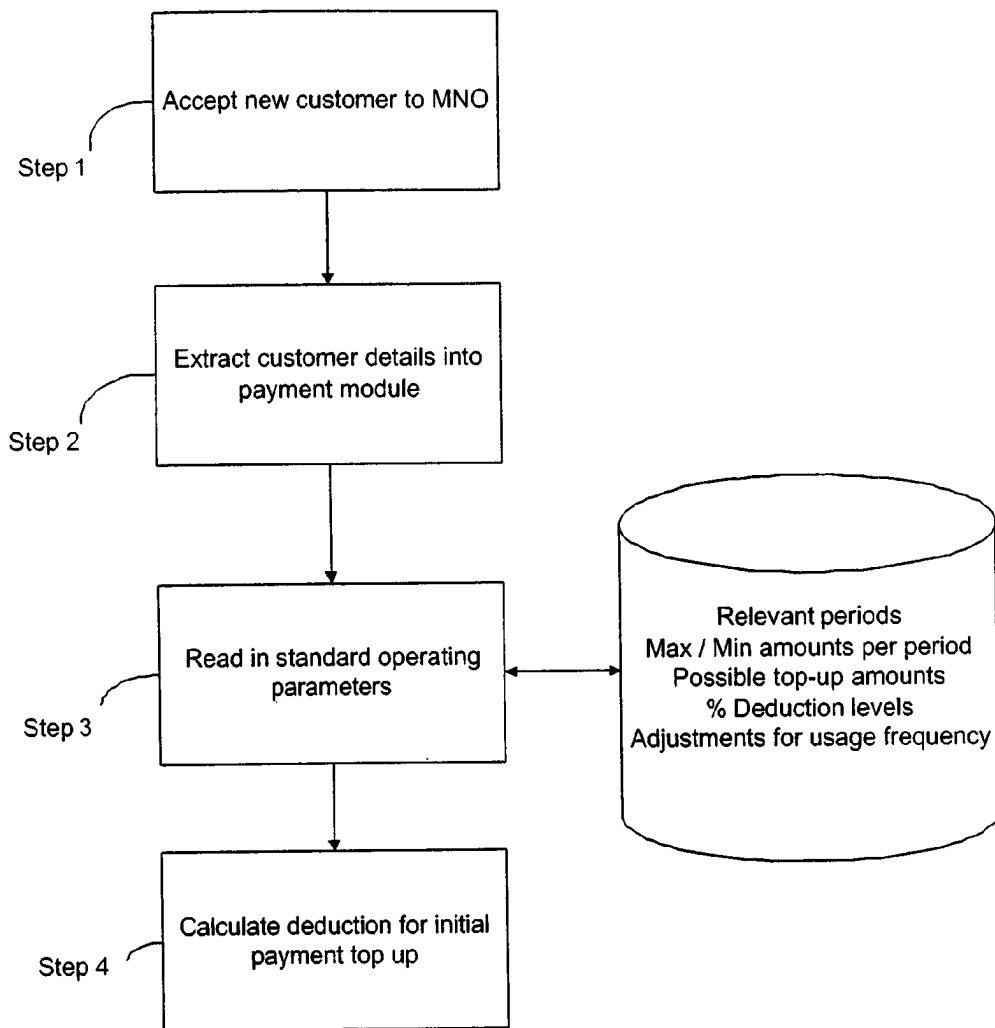


Figure 1B

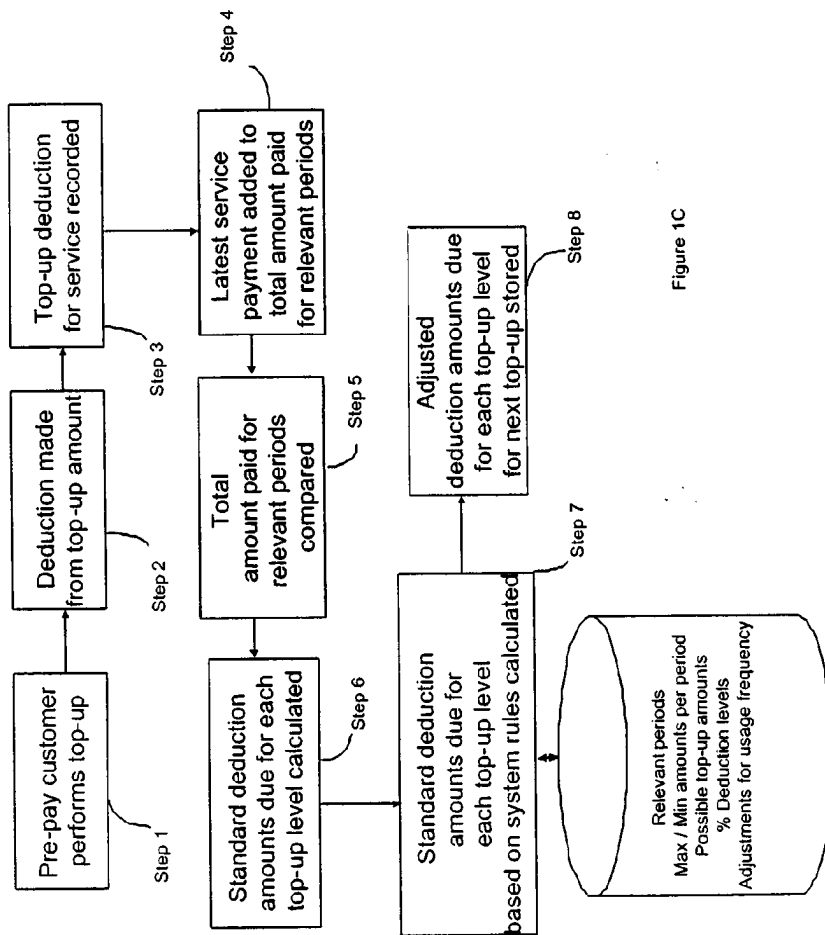


Figure 1C

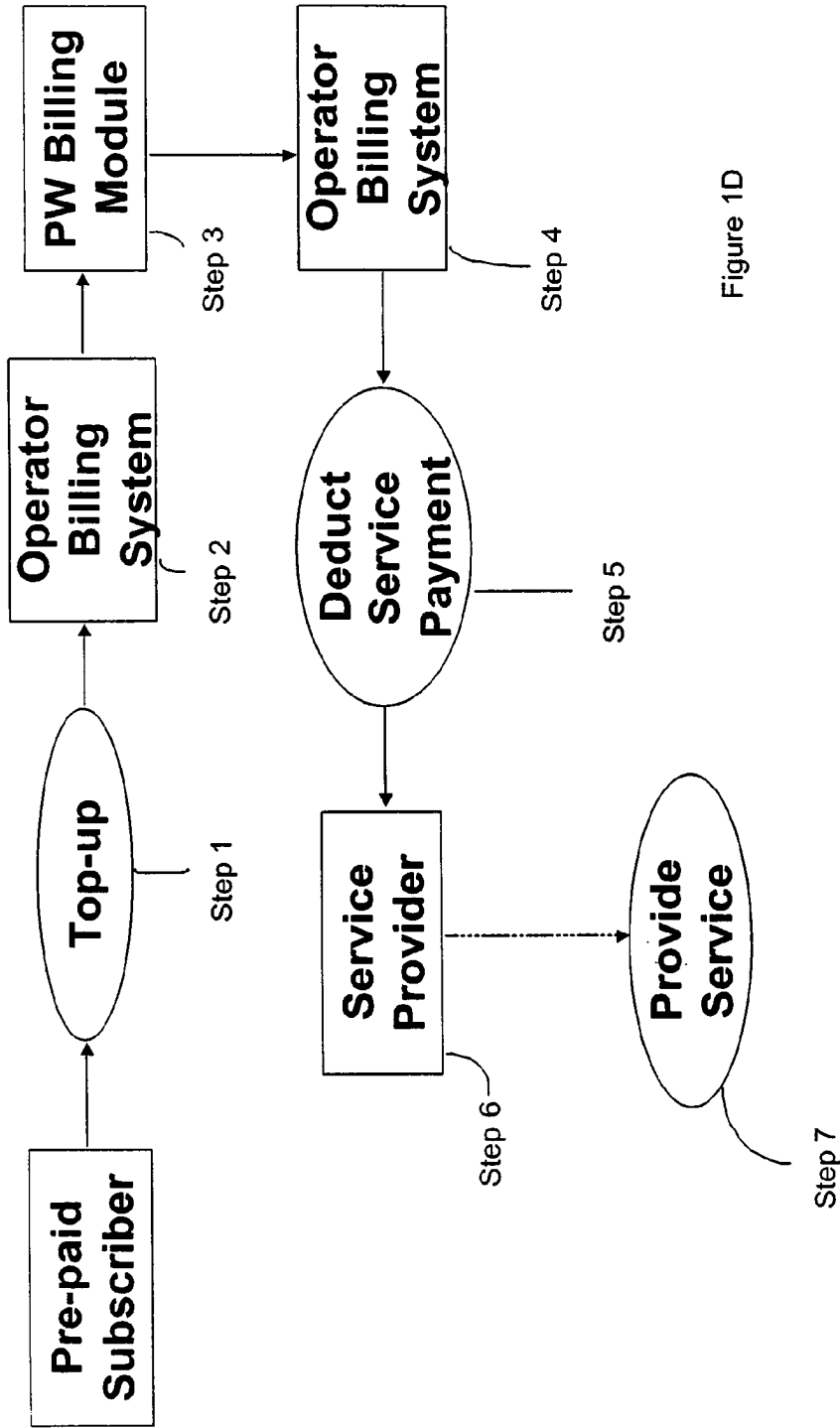


Figure 1D

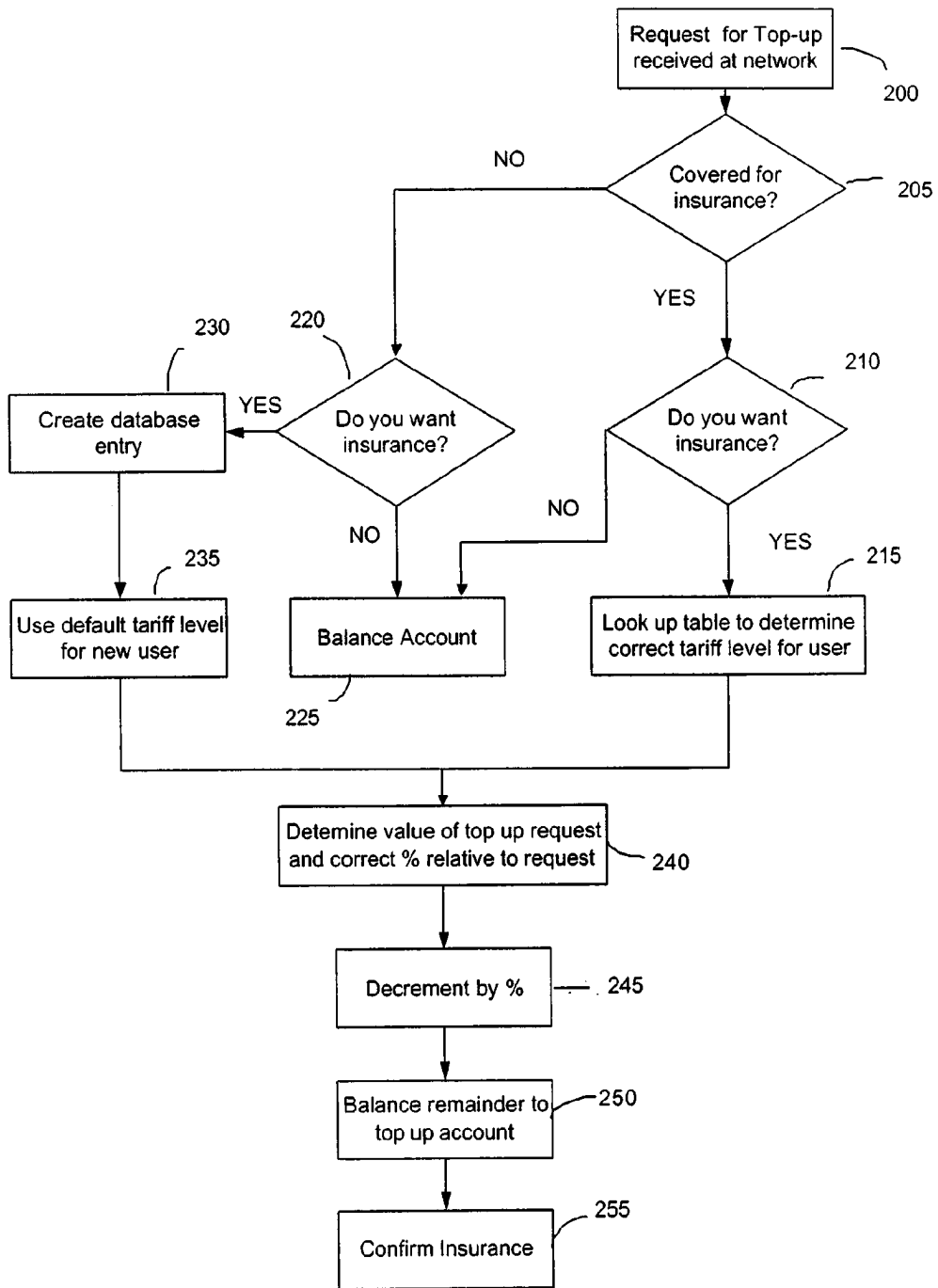


Figure 2

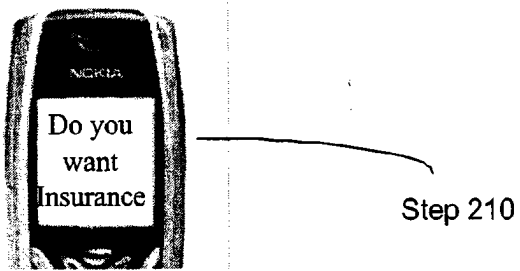
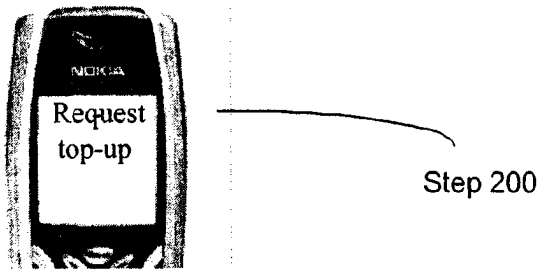


Figure 2A

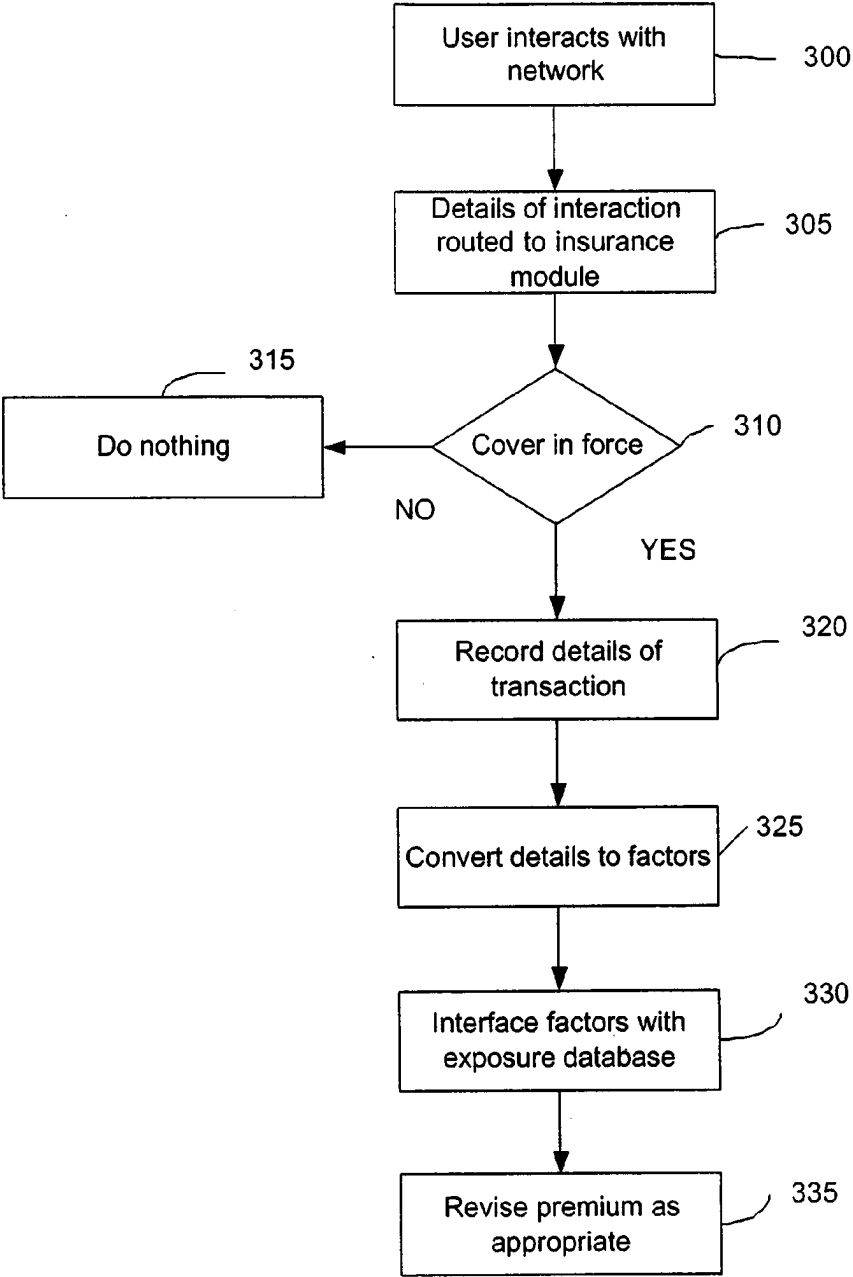


Figure 3

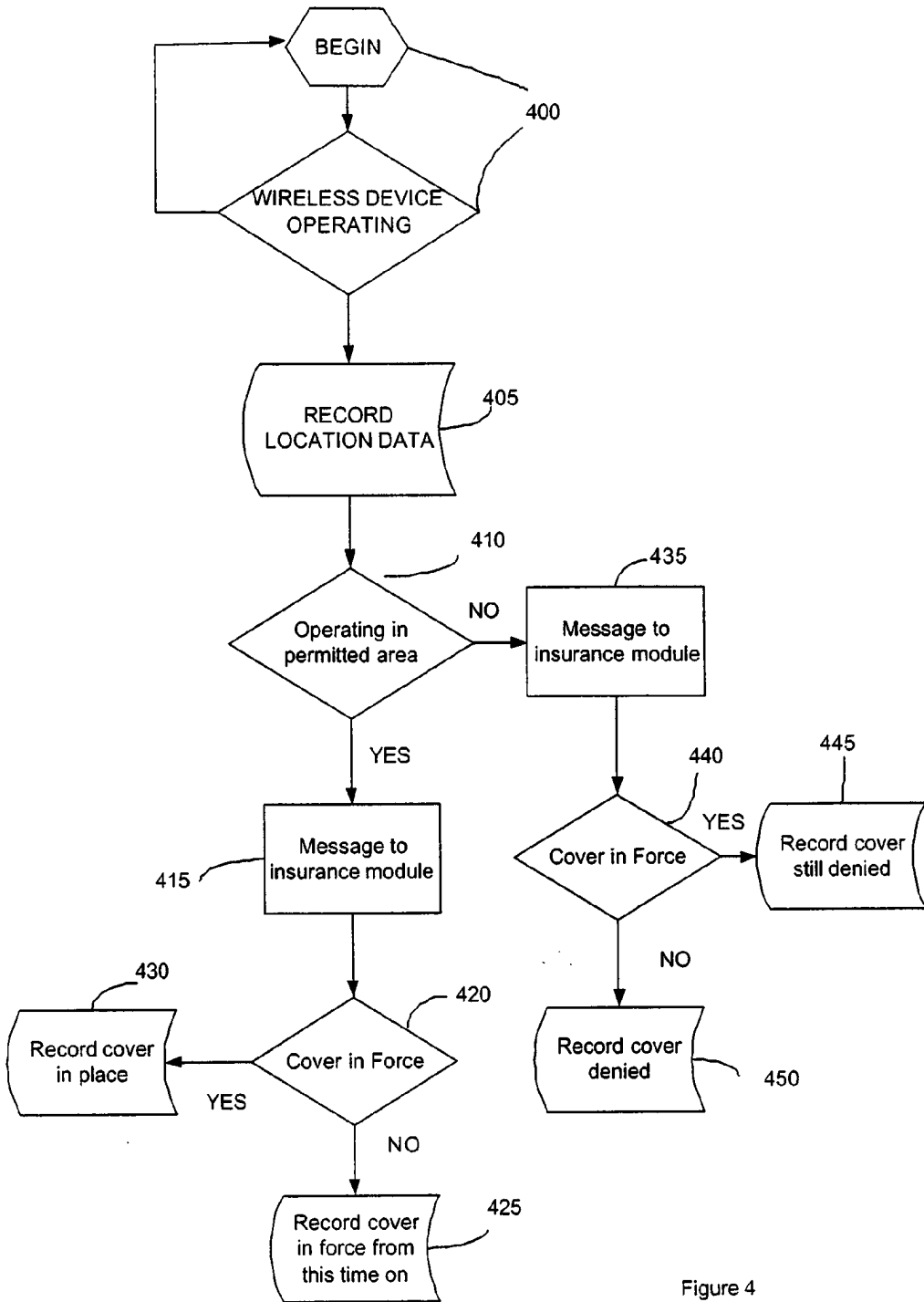


Figure 4

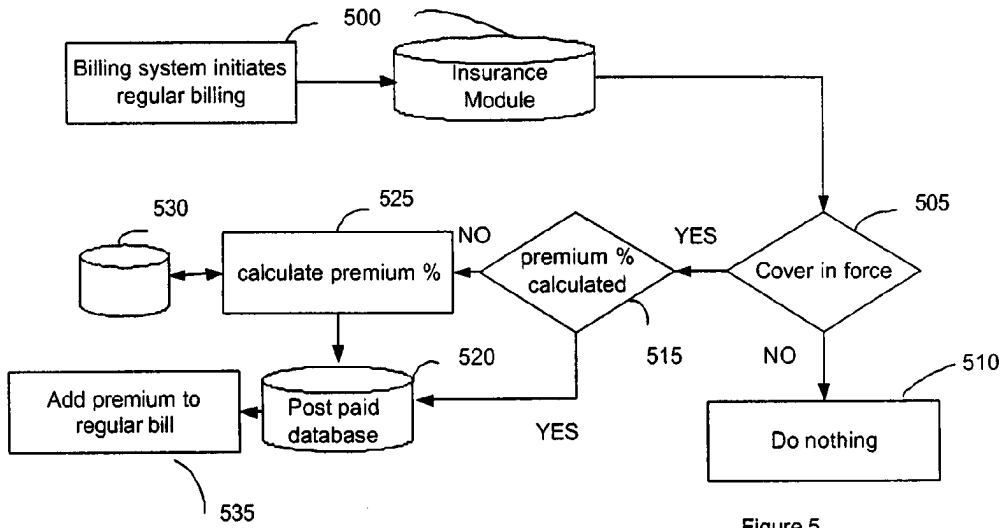


Figure 5

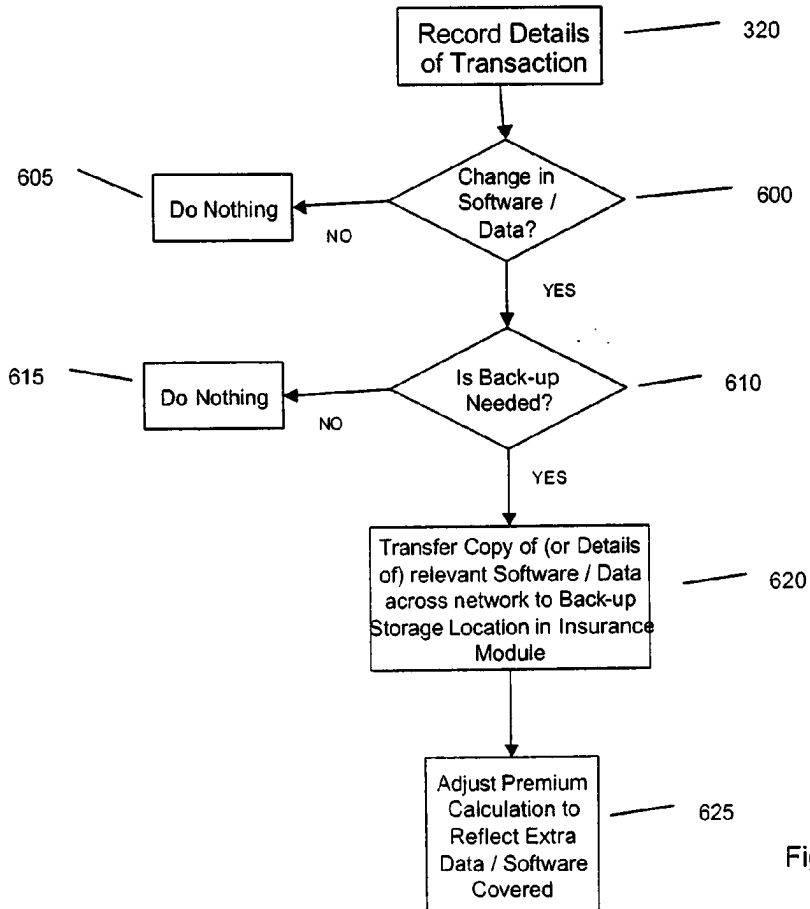


Figure 6

