

Mobile Telecommunication Connectivity Configurable On Mobile Device

Field of Invention

[0001] The present invention relates to selection of a telecommunication connectivity that is configured on a mobile device. In particular, the invention relates to a mechanism for detecting and changing the connectivity of a mobile device according to a subscriber's criteria.

Background

[0002] A mobile telecommunication device is typically identified by activating a Subscriber Identity Module (SIM) card, which is registered with a Primary public network Service Provider (PSP) in one's home country; the subscriber's SIM card is appropriately referred to as the home-SIM card while the network is referred to as the home-public mobile network (or home-PMN). Other alternate service providers (ASPs) may offer services similar to or in addition to those offered by a PSP. Often, the services of an ASP are at a different cost and/or service quality. In order to make use of the services offered by an ASP, a subscriber with a PSP must additionally subscribe to the ASP.

[0003] Before using the services of an ASP, the subscriber has to learn the dialing mechanisms, for example, for forwarding the services of the PSP through the ASP. Such dialing mechanisms may involve a number of steps. Each step may involve entering a string of numbers identifying an access code, a user account and a user password besides the recipient's country code, area code and telephone number. Subscribing to a number of services with different ASPs may require a subscriber to remember all the different dialing mechanisms; this can be daunting to a subscriber. A limitation of conventional mobile device is that these long string of numbers required to be entered for accessing service of an ASP cannot be conveniently stored with or dynamically applied to the telephone number and picked from the address book.

[0004] Another disadvantage of the conventional mobile telecommunication is that when a subscriber switches to a local SIM card issued by a PSP of a visited mobile network (VPMN), the home-PSP would not be able to locate its subscribers.

[0005] It can thus be seen that there exists a need for a client program operable in a mobile device for connecting one's mobile device to a preferred PMN/ASP network based on some predetermined service criteria.

Summary

[0006] The following presents a simplified summary to provide a basic understanding of the present invention. This summary is not an extensive overview of the invention, and is not intended to identify key features of the invention. Rather, it is to present some of the inventive concepts of this invention in a generalised form as a prelude to the detailed description that is to follow.

[0007] In one embodiment, the present invention provides a client program for configuring a connectivity of a mobile device. The client program comprises inputs relating to subscriber's connection criteria, subscription profile, and identity profile. The client program recommends a dialing preference based on the subscriber's inputs in addition to available network.

[0008] In another embodiment, the present invention provides a mobile communication connectivity method. The method comprises installing a client program in a subscriber's mobile device; connecting the mobile device to a primary network; the client program determining whether a recommended connection through an alternate service provider (ASP), which the subscriber has subscription with, is the active connection; and, if the decision is positive, accepting and allowing the recommended ASP connection to be made.

[0009] In another embodiment, the present invention provides a mobile communication device having a SIM card and a client program according to any one of claims 1-6.

[0010] In another embodiment, the subscriber's connection criteria comprise cost, quality of network connection and type of communication service. Preferably, the recommended dialing preference is a weighted combination of the subscriber's connection criteria.

[0011] In another embodiment, the subscription profile comprises subscription to an alternate service provider (ASP). In another embodiment, the identity profile comprises a SIM card; preferably, the SIM card is associated with a home-PSP or a visited-PSP. Preferably, the client program and method comprise forwarding the recommended connection through one of the ASP.

[0012] In another embodiment of the mobile device, the device comprises a button for launching the client program. In another embodiment, the button is a touch-sensitive area on a menu generated by the client program.

Brief Description of the Drawings

[0013] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0014] FIG.1 illustrates the various possible states of connectivity of a mobile device;

[0015] FIG.2 illustrates routings of telecommunication lines through alternate service providers in a home-network according to an embodiment of the present invention;

[0016] FIG. 3 illustrates routings of telecommunication lines through alternate service providers in a visited-network according to another embodiment of the present invention;

[0017] FIG. 4 illustrates routings of telecommunication lines through alternate service providers in a localised visited-network according to another embodiment of the present invention;

[0018] FIG. 5 illustrates a client program and method for implementing the routing of telecommunication lines according to another embodiment of the present invention; and

[0019] FIG. 6 illustrates a communication connection completion process according to yet another embodiment of the present invention.

Detailed Description

[0020] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however, that this invention may be practised without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

[0021] FIG. 1 illustrates the various network connectivity states that a mobile telecommunicating device 210 may be logged-on to a PMN/ASP. As shown in FIG. 1, the connectivity states may be home, auto-roaming or localised roaming. In home connection, a mobile device is usually logged-in to the PSP with which one has subscribed to, for example, by inserting a SIM card issued by the PSP; when number portability is supported, a user may connect one's mobile device to another PSP by switching network. In either case, a user may additionally subscribe to an alternate service provider (ASP).

[0022] Auto-roaming refers to a mobile device logging onto a visited public mobile network (or VPMN), for example, VPMN 310 as shown in FIG. 3, with one's home-

SIM card, such as home-SIM 230. In localised roaming, a user removes one's home-SIM card and inserts a visiting-SIM card, such as visiting-SIM 410 issued by the VPMN 310 as shown in FIG. 4.

[0023] Network connection often depends on a user's preferences and calling plan criteria. For example, when a mobile device is in its home connectivity state and a user wishes to make an international telecommunication service, such as a voice service, one can choose the international call to go through an ASP and make use of the lower rates offered by the ASP. While auto-roaming, one may select a VPMN over another, for eg, for its lower roaming charges or better signal strength. In localised roaming, network preference may be community-based; for eg., one's entire family may be using the service of a particular PSP. In addition, prepaid users may have different preferences from post-paid users, for example, in using GPRS/3G data services. Further, voice service may require better service quality than data service.

[0024] FIG. 2 illustrates a subscriber S1 having subscription with a home-PSP and additional subscriptions with two ASPs 250,260 according to an embodiment of the present invention. As shown in FIG. 2, the subscriber S1 has a home-SIM card 230 in one's mobile device 210. The mobile device 210 is connected to the home-PMN 220 associated with the home-PSP. As shown in FIG. 2, subscriber S1 receives an incoming call from a caller S3. Caller S3 is connected to an originating-PMN 280, which is relayed to the home-PMN 220. Also as shown in FIG. 2, subscriber S1 makes an outgoing call to a recipient S2. The recipient S2 is connected to a terminating-PMN 240, which is connected to the home-PMN 220 of S1 via a communication link 221.

[0025] In one embodiment of the present invention, the subscriber S1 has an additional subscription with an ASP 250. To make an outgoing call, subscriber S1 logs one's mobile device 210 on to the home-PMN and selects the call to go through the ASP 250 to the terminating-PMN 240 via a communication link 251, as shown in FIG. 2. Subscriber S1 may have an additional subscription with another ASP 260, according to another calling plan criteria or availability of service, and may connect to a terminating-PMN 240 through the other ASP 260 via another communication link 261. Other ASPs may be similarly subscribed to and the subscriber S1 has a choice to select

other communication links with a terminating-PMN 240. The ASP 250,260 may provide the same services as the home-PSP or it may provide services with different costs, service quality or service availability. The present invention allows a subscriber S1 to configure one's mobile device 210 to log-on to any one of the available ASPs 250,260 according to some predetermined criteria and makes use of the services provided by one of the ASPs, for example, when the terminating-PMN 240 is located outside the home-PMN 220 and the preferred ASP offers lower international call charges. The configuration of the mobile device 210 to connect with a preferred ASP will be described with a client program 500, as shown in FIG. 5.

[0026] FIG. 3 illustrates a subscriber S1 having a mobile device 210 switched to auto-roaming in a VPMN according to another embodiment of the present invention. As shown in FIG. 3, the mobile device 210 of the subscriber S1 is logged-on to the VPMN 310 through the use of the home-SIM card 230. The VPMN 310 is connected to the home-PMN 220 by some roaming agreements made by the two PSPs. By switching network from the home-PMN 220 to the VPMN 310, a temporary contact number or MSISDN is allocated by the VPMN 310 to the subscriber S1. Any call made to the mobile device 210 is directed through the home- and visited-PMN and auto-roaming charges apply. A call made from the mobile device 210 to a recipient S2 is directed through the VPMN; again, auto-roaming charges apply.

[0027] FIG. 3 also illustrates subscriber S1 having subscription with ASP 350 according to another embodiment of the present invention. Thus, the subscriber S1 can make use of the services of the ASP 350 according to some predetermined calling plan criteria. In use, in-coming calls from caller S3 are routed from the originating-PMN 280, the home-PMN 220 and the visited-PMN 310 through the ASP 350 to subscriber S1. In another embodiment, the ASP 350 is located in the home-country of subscriber S1. As shown in FIG. 3, a call originating from caller S3 to subscriber S1 is alternatively selected to go through the ASP 350, for example, via a communication link 351. In another embodiment, the ASP 350 is hosted in a virtual world.

[0028] FIG. 3 illustrates subscriber S1 having a further subscription with another ASP 360. In use, outgoing calls to recipient S2 are routed from the visited-PMN 310 through

a direct communication route 311 or the ASP 360 to the terminating-PMN 240. In one embodiment, ASP 360 is located in the visited-country. As shown in FIG. 3, outgoing call from S1 to recipient S2 is alternatively selected to go through the ASP 360 via another communication link 361. In another embodiment, the ASP 360 is hosted in a virtual world, providing service in cyber space.

[0029] FIG. 4 illustrates a subscriber S1 with a mobile device 210 logging-on to a VPMN 310 through the use of a local SIM card, or visiting-SIM 410, issued by the VPMN 310 according to another embodiment of the present invention. With a local-SIM card 410, the subscriber 210 is able to make or receive calls to subscribers in the VPMN 310 at the local rate, which is relatively cheaper than the auto-roaming charges in the second embodiment. This localised-roaming embodiment allows the subscriber S1 to configure one's mobile device 210 to make a communication link 412 between the VPMN and the ASP 450 according to some predetermined criteria, for example, for outgoing calls to recipient S2 located outside the VPMN 310. In one embodiment, the ASP 450 is any one of the available ASPs 250,260,350, 360. By configuring one's mobile device 210 to log-on to a preferred ASP, the present invention establishes a connection between the home-PMN 220 and the preferred ASP 450. Thus, any incoming call made through the home-PMN 220 is routed 412 to the subscriber S1 through the ASP 450. Any outgoing calls to recipient S2 are routed through the VPMN directly 311 to the terminating-PMN or indirectly 412 through the ASP 450. Such indirect routing 412 is preferred when the terminating-PMN 240 is outside the VPMN 310. Advantageously, the subscriber S1 needs only one mobile device 210 and S1 remains contactable even as one switches SIM card and moves from one PMN to another.

[0030] In one embodiment of the invention shown in FIG. 4, such configuration of the mobile device 210 comprises call forwarding or call diversion activated by the subscriber S1 from the home-PMN to the ASP 450. In another embodiment, such configuration of the mobile device 210 is activated by the subscriber S1 to the ASP 450 associated with the visited country.

[0031] FIG. 5 illustrates a client program 500 for configuring a mobile device according to another embodiment of the present invention. As shown in FIG. 5, the client program 500 is stored in the mobile device 210 of a subscriber S1 together with some predetermined telecommunication connection criteria 523, subscription profile 522, identity profile 521 and available network 524. For example, subscriber S1 may wish to make a connection based on quality of service as a first criterion followed by cost as the second criterion. By processing the subscriber's input and available network that is detected by subscriber's mobile device 210, the client program 500 recommends a dialing preference 525. A first dialing preference 525a may be a connection for a normal voice service; a second dialing preference 525b for data service, and so on. Other dialing preferences may be generated based on weighted combinations of the subscriber's input and types of communication services; for example, it may be a weighted combination of cost, quality of network connection and type of communication service. In one embodiment of the client program, the client program 500 is stored or embedded in a central processing unit of a mobile device 210, for example, during manufacturing. In another embodiment, the client program 500 is stored in the SIM card 230,410, for example, by a PSP. Alternatively, the client program 500 is uploaded to a mobile device through a value-add re-seller, for example, as an after-market solution when a subscriber adds additional features to the SIM card 230,410.

[0032] Upon switching on the power of the mobile device 210, the client program 500 stored in the mobile device 210 detects the available PMN and the active SIM card 230,410. The network detection may be invoked by a subscriber S1 moving from one network and auto-roaming in another network as shown by process box 511; it may be invoked by a subscriber selecting another available network (when number portability is supported); it may also be invoked by a subscriber S1 changing the mobile connectivity, for example, by changing the SIM card, as shown by process box 512. It may also be invoked by the subscriber S1 soft-switching SIM card by selecting from a menu, for eg, that provided by a SIM-tool-kit (STK); or the subscriber S1 may launch the client program 500 manually by activating a button on the mobile device 210 or selecting from a menu, such as a touch-sensitive area, generated by the client program 500 on a display screen of the mobile device 210. After executing step 510, a preferred

network is then made the active connection by the mobile device 210 without any input from S1 or another application residing in the mobile device 210.

[0033] Also stored in modules of the client program 500 are the ASPs that subscriber S1 have subscriptions with, as shown by process box 522, and a list of the subscriber's identity 521 (such as the SIM cards 230,410 owned by the subscriber S1).

[0034] As shown in FIG. 5, the subscriber's connection criteria 523, ASP profiles 522, subscriber identity 521 and available network 510 are inputted to the client program 500. After processing all the inputs, the client program 500 recommends a connection RSID in step 520 and provides a selection of dialing preferences 525a,525b,etc. in step 525.

[0035] Proceeding to step 530, the client program 500 determines whether the recommended connection RSID is the same as the active connection ASID? If the decision in process box 530 is positive, i.e "yes", the program 500 proceeds to process or step 531.

[0036] In step 531, the program 500 determines whether the home connection HSID diversion is active. If the decision in step 531 is positive, i.e. "yes", the client program 500 proceeds to step 580. In step 580, the client program 500 updates the active connectivity to the preferred ASP. The subscriber S1 is then able to use the services of the ASP, for eg., for making a voice call, a SIP/VoIP call, and so on, based on one's dialing preferences 525,525a,525b,etc and connection criteria 523.

[0037] If the decision in step 531 is negative, i.e. "no", the client program 500 proceeds to step 560. In step 560, the client program 500 switches on the home connection HSID on the user's mobile handset 210. The client program 500 then sets and activates the home connection diversion in step 561. As a result of activating the home connection diversion, the client program 500 connects the mobile handset 210 to the recommended connection RSID in step 570. Following this, the client program 500 updates the alternate connection ASID as the preferred active connection ASP in step 580.

[0038] Moving back to the flow chart shown in FIG. 5, when the decision in step 530 is negative, the client program 500 jumps to step 540. In step 540, the client program 500 determines whether the recommended connection RSID is the home connection HSID.

[0039] If the decision in step 540 is negative, the client program 500 jumps to step 550. In step 550, a decision is then made whether the home connection diversion is active. If the home connection diversion of the mobile handset 210 is not active, the client program executes steps 560, 561, 570 and 580 and connects the mobile handset 210 to the preferred active connection ASP. If the decision in step 550 is positive, the client program 500 jumps to step 570 and, again, connects the mobile handset 210 to the preferred active connection in step 580.

[0040] If the decision in step 540 is positive, the client program 500 connects the handset 210 to the home connection and sets it as the active connection ASID in step 541. Following this, the client program 500 inactivates the home connection HSID diversion in step 542. The client program 500 then ends configuration of the handset 210 by executing step 580 and updating the connection to the preferred active connection, ASP.

[0041] As described above, the present invention involves installing a client program 500 into a mobile device 210. An advantage of the present invention is that the client program 500 resides in the mobile device and it follows the subscriber. A server of a PSP residing in a specific country would not be able to meet all individual subscriber's connectivity criteria 523. Execution of the client program 500 provides a selection of dialing preferences 525, 525a, etc based on a subscriber's criteria 523, subscription profile 522, SID profile 521 and available network 524. Again, a server of a PSP would not be able to provide a selection of dialing preferences 525 for a subscriber to choose from. Another advantage of the present invention is that dialing of a connection according to a selected dialing preference 525, 525a, etc is integrated and automated by the client program 500; hence, there is no intimidatingly long strings of access numbers for a subscriber to remember and enter. In addition, with localized roaming 130 provided in the present invention, the subscriber S1 remains contactable even when S1 switches SIM card and moves from one PMN to another. Thus, the client program 500

according to the present invention provides a pseudo auto-roaming experience to a subscriber. For example, if a dialing preference 525, 525a, etc is for S1 to communicate with S2 using Skype when S1 is in a hot-spot and S2's Skype status is "available", the client program 500 connects S1 to S2 through Skype without S1 having to consciously choose Skype; in the event that such a preferred connection cannot be made, the client program 500 would make a connection based on a second dialing preference 525, 525a, etc, thus providing a fail-over or hop-over connectivity mechanism. This fail-over or hop-over connection mechanism is distinguished from the switching between cellular and wireless data channel in Fixed Mobile Convergence (FMC). For example, in FMC, cellular and WiFi networks are closely coupled; when a GSM terminal is moved into a WiFi hotspot and the WiFi channel quality meets a minimum quality of service (QoS), connection of the mobile terminal is automatically switched over to the WiFi channel, such as a VoIP. In a similar way, when the WiFi channel's QoS is below the minimum quality, the mobile terminal is switched over from WiFi to GSM. In FMC, the PMN's backend server synchronises the switching over of channel connection of mobile terminals. However, in the present invention, the fail-over or hop-over connection is carried out by the client program 500 based on predetermined subscriber's connectivity criteria and available mobile network.

[0042] FIG. 6 illustrates a connection completion process 600 according to yet another embodiment of the present invention. After a recommended alternate connection ASID is made the preferred active connection ASP in step 580 of FIG. 5, a subscriber S1 is now able to make a communication connection through the preferred ASP, for example by selecting a recipient S2 from a contact list in mobile device 210. As shown in FIG. 6, the mobile device 210 acquires a recipient's contact name entered or selected by S1 in step 610, and together with one of the dialing preferences 525, 525a, etc, the process 600 selects a dialing process in step 620. A communication connection is then made in step 630. In step 640, the process 600 decides whether the connection is successful. If the selection and dialing processes in steps 620 and 630 are not successful, the process 600 reverts to step 620 and another dialing preference 525, 525a, etc is selected and another connection is made. If the selection and dialing processes in steps 620 and 630 are successful, a communication connection through one of the preferred dialing 525, 525a, etc is made in step 650. In another embodiment, further post-processing is also

executed by process 600, for example, to inform S1 of the call duration, call cost, credit balance, and so on.

[0043] In another embodiment of the connection completion process 600, if a selection and dialing processes in steps 620, 630 and 640 are not successful, the process reverts to step 620 and a connection is attempted a predetermined number of time with the same dialing preference 525, 525a, etc. before another connection is attempted with the next dialing preference 525, 525a, etc.

[0044] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the invention. For example, a mobile communication includes cell technology such as GSM, 3G, and so on. A mobile network includes cellular technology; WiFi, WiMax, and so on; and Bluetooth. In another example, when making a voice service on one's mobile handset 210, one may select Skype, VoIP, Google Talk, Push-to-Talk (PTT) and so on; when defining dialing preferences 525, 525a, etc one may include various data services, such as, SMS, MMS or Instant Messaging, such as Yahoo IM, and so on. In addition, the present invention is not platform dependent; the client program may be implemented on Java ME, Windows Mobile, Windows Smartphone, Symbian technology, and other emerging mobile platforms.

CLAIMS:

1. A client program for configuring a connectivity of a mobile device comprising:
inputs relating to subscriber's connection criteria, subscription profile, and identity profile;
wherein said client program recommends a dialing preference for the mobile device based on the subscriber's connection criteria, subscription and identity profiles and available network.
2. A client program according to claim 1, wherein said subscriber's connection criteria comprise cost, quality of network connection and types of communication service.
3. A client program according to claim 2, wherein the recommended dialing preference is a weighted combination of cost, quality of network connection and types of communication service.
4. A client program according to any one of the preceding claims, wherein said subscription profile comprises subscription with an alternate service provider (ASP).
5. A client program according to any one of the preceding claims, wherein said subscriber's identity profile comprises one or more subscriber identity module (SIM) cards issued by a primary service provider (PSP).
6. A client program according to claim 4 or 5, wherein said primary service provider (PSP) comprises a home-PSP and/or a visited-PSP.
7. A mobile communication connectivity method comprising:
installing a client program in a subscriber's mobile device;
connecting the mobile device to a primary network (PMN);
the client program determining whether a recommended connection through an alternate service provider (ASP), which the subscriber has subscription with, is an active connection; and

if the decision is positive, accepting and allowing the recommended ASP connection to be made.

8. A method according to claim 7, wherein the client program comprises accepting the following subscriber's inputs: connectivity criteria, identity profile and subscription profile in addition to an available mobile network.
9. A method according to claim 8, wherein the connectivity criteria comprise cost, quality of network connection and type of communication service.
10. A method according to claim 8 or 9, wherein the recommended connection or dialing preference is based on the subscriber's inputs.
11. A method according to claim 10, wherein the dialing preference comprises performing a weighted combination of cost, quality of network connection and type of communication service.
12. A method according to claim 11, wherein the dialing preference comprises a selection of dialing preferences.
13. A method according to claim 12, wherein a connection is attempted a predetermined number of time for any one of the dialing preferences before another connection is attempted with a next preferred dialing in the selection.
14. A method according to any one of claims 7-13, wherein the PMN comprises a home-PMN and/or a visited-PMN.
15. A method according to any one of claims 7-14, further comprising forwarding the connection from the PMN to the recommended alternate service provider (ASP).
16. A mobile communication device having a SIM card, the mobile device comprising:

a client program according any one of claims 1-6 for configuring a connectivity of the mobile device.

17. A device according to claim 16, wherein the client program is launched by changing a network connection or SIM card.

18. A device according to claim 16 or 17, further comprising a button for launching the client program.

19. A device according to claim 18, wherein the button is a touch-sensitive area on a menu generated by the client program.