Title: CALL ASSISTANT FOR MANAGING INCOMING CALLS TO OUTBOUND ROAMERS (CAO)

Abstract: The present invention provides a method and system for facilitating mobile communication between a calling party and a called party. The method includes establishing the mobile communication, via a service node, between a calling party and a called party upon receiving a response from the calling party for a mobile communication request made by the calling party to the service node. The method further includes facilitating by the service node, charging of the calling party for the established mobile communication.
CALL ASSISTANT FOR MANAGING INCOMING CALLS TO OUTBOUND
ROAMERS (CAO)

Related Applications
This application claims the benefit of U.S. Provisional Patent Application No. 61/499,452, filed on June 21, 2011, titled "CALL ASSISTANT ON MANAGING INCOMING CALLS FOR OUTBOUND ROAMERS," which is incorporated by reference in its entirety herein.

BACKGROUND OF THE INVENTION

Field of the Invention
The present invention generally relates to mobile communications. More specifically, the invention relates to enabling incoming calls for an outbound roaming called party without charging him for the same.

Background
Mobile communications during roaming contribute to a major percentage of a network operator's revenue and specifically, voice traffic and SMS traffic contributes even better percentage of the network operator's margin. With increasing competition and regulatory control, network operators look for solutions to enhance both local and roaming revenues.

Mobile subscribers can be both prepaid and postpaid. Generally, prepaid subscribers are in majority since the prepaid services are relatively easier and quicker to avail of as compared to postpaid services. Prepaid subscribers generally do not prefer to receive incoming calls while roaming to avoid roaming charges, further, there may be situations when even postpaid subscribers also would not like to receive calls and SMS during roaming to avoid airtime charges. This may result in loss of potential revenues for the network operators.

One common problem of industry is that despite when calling party is paying for receiving calls at home network, the called party still needs to pay rerouted calls when roaming. This causes some outbound roamers, particularly prepaid ones to
avoid receiving incoming calls by either turning handset off unless making calls, setting unconditional call forwarding to voice mail, or barring incoming calls while roaming. As a result, operators lose more mobile terminated roaming revenue and callers are unable to connect with recipients, i.e., called party. Ideally the recipients would like the calling party to pay for the rerouted roaming charges if they can and really want to reach the recipients.

One solution to address the above problem is to have the caller dials a prefixed recipient number. The problem is that the caller might not know the recipient is roaming and dialing a prefixed recipient number will not allow the calling party to use his phone book. The solution is also limited to intra-operator calls, as both parties need belong to the same operator.

Another solution that addresses this problem involves a two-step call setup process. In the first step the caller is informed that the recipient can only be reached if the caller pays for the call and dial another premium number to reach the recipient, in the second step, the caller calls the premium number and enters the recipient number to reach the recipient. Although, this process is not limited to intra-operator calls but still the calling party needs be limited to a home operator calling at the home network, However, the calling party has to make a separate call and enter the recipient number again (unable to use the phone book) which greatly affects caller experience.

In accordance with the foregoing, there is a need in the art of a system and method for a seamless one step solution for calling party to paying for rerouted calls to outbound roaming called parties.

SUMMARY

The present invention is directed towards a method for facilitating mobile communication between a calling party and a called party. The method includes establishing mobile communication, via a service node, between a calling party and a called party upon receiving a response from the calling party for a mobile
communication request made by the calling party to the service node. The method further includes facilitating by the service node, charging of the calling party for the established mobile communication.

The present invention also presents a system for facilitating mobile communication between a calling party and a called party. The system includes a service node for establishing mobile communication between the calling party and a called party upon receiving a response from the calling party for a mobile communication request made by the called party to the service node. Further, the service node facilitates charging of the calling party for the established mobile communication.

**BRIEF DESCRIPTION OF DRAWINGS**

In the drawings, the same or similar reference numbers identify similar elements or acts.

FIG. 1 illustrates a system for implementing Call Assistant for managing incoming calls for an Outbound roamer (CAO) service, in accordance with an aspect of the present invention;

FIG. 2 illustrates a flowchart depicting the CAO service, in accordance with an aspect of the present invention;

FIG. 3 illustrates an internal architecture of a service node for implementing the CAO service, in accordance with an aspect of the present invention;

FIG. 4 illustrates a flow diagram for implementing the CAO service in a scenario where calling party pays for the MTC roaming leg, when called party is postpaid without SCP and calling party is postpaid, in accordance with an aspect of the present invention;

FIG. 5 illustrates a flow diagram for implementing the CAO service in a scenario where calling party pays for the MTC leg (TNF or MSRN), when called party B is postpaid with SCP and calling party A is also postpaid, in accordance with an aspect of the present invention; and

FIG. 6 illustrates a flow diagram for implementing the CAO service in a scenario where calling party pays for the MTC leg (TNF or MSRN), when called
party B is postpaid with or without SCP and calling party A is pre-paid, in accordance with an aspect of the present invention.

**DETAILED DESCRIPTION**

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in the following description, for purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one having ordinary skill in the art that the present invention may be practiced without these specific details, in some instances, well-known features may be omitted or simplified, so as not to obscure the present invention. Furthermore, reference in the specification to "one aspect" or "an aspect" means that a particular feature, structure or characteristic, described in connection with the aspect, is included in at least one aspect of the present invention. The appearance of the phrase "in an aspect", in various places in the specification, does not necessarily refer to the same aspect.

The present invention provides a system and a method where a home network facilities its outbound reamer, to establish mobile communication like Mobile Terminated (MT) calls or Short Message Service (SMS) with a calling party, for which the calling party pays. This arrangement of mobile communication is hereinafter interchangeably referred to as "Call Assistant for managing incoming calls to Outbound roamer (CAO)", where the charges for the call and SMS are collected from the calling party. This CAO service deals with problem of outbound roamers who does not want to receive calls at un-wanted times, or when out-of-balance, or wants to receive urgent calls only, or has forwarded calls to a fixed line to avoid roaming charge or is only willing to take MT SMS.

FIG. I illustrates a system 100 for implementing the CAO service for a subscriber of Home Public Mobile Network (HPMN) 102, in accordance with an aspect of the present invention. HPMN 102 includes a service node 104 that establishes mobile communication between a calling party 106 (i.e., the subscriber of HPMN 102) and a called party 108 that is outbound roaming (i.e., a subscriber of same operator as HPMN 102, or a different operator). Service node 104 also facilitates charging calling party 106 for the established mobile communication.
Voice calls received by called party 108 with the help of the service node 104 from calling party 106, for which calling party 106 pays is hereinafter interchangeably referred to as "CAO" service. Similarly, the SMSs received by called party 108 with the help of service node 104 from calling party 106, for which calling party 106 pays is hereinafter interchangeably referred to as "Pay My Roaming" service.

In an aspect of the present invention, an outbound roaming subscriber of HPMN 102 first needs to register for the CAO service in order to receive calls and SMS that are paid by a calling subscriber. Thus, to register the subscriber for the CAO service, the subscriber details are provisioned in an application database. The application exposes a standard extensible Markup Language (XML) over Hypertext Transfer Protocol (HTTP) Application Programming Interface (API) which is invoked by HPMN 102 operator's provisioning system or Customer Relationship Management (CRM) system to provision subscribers in service node 104. In another aspect of the present invention, the subscriber does not register for the CAO service and avails the CAO service on the need basis.

Service node 104 acts as an active node, and it has its own point codes and Global Titles (GTs). In a first aspect of the present invention, service node 104 facilitates calls between calling party 106 and called party 108 through Mobile Application Part (MAP) protocol, ISDN User Part (!SUP) protocol or Intelligent Network (IN) protocol. In an aspect of the present invention, both calling party 106 and called party 108 are subscribers of HPMN 102's operator. In another aspect of the present invention both calling party 106 and called party 108 are subscribers of different networks. Further, calling party 106 and called party 108 can be either prepaid or postpaid subscribers. In an aspect of the present invention, calling party 106 and called party 108 are both present in HPMN 102. In another aspect of the present invention, calling party is present in HPMN 102 while the called party 108 is roaming in a Visited Public Mobile Network (VPMN). In yet another aspect of the present invention, calling party 106 is roaming in the VPMN and called party 108 is also present in HPMN 102. In yet another aspect of the present invention, both calling party 106 and called party 108 are roaming in the VPMN. In various aspects of the present invention, both HPMN 102 and the VPMN are of the same mobile operator. Further, HPMN 102 includes:
- A Gateway Mobile Switching Center (GMSC)/Service Switching Function (SSF) to setup collect call between calling party 106 and called party 108.
- A Short Message Service ("enter (SMSC) 112 to send and receive SMS from calling party 106 and called party 108, respectively.
- An Unstructured Supplementary Services Data (USSD) gateway 114 to send and receive USSD commands from called party 108 and calling party 106, respectively.
- A prepaid Signaling Control Point (SCP) 116 to charge calling party 106 for the CAO service when called party 108 is a prepaid subscriber.
- An Operation and Maintenance (O&M) console 118 to monitor calls received through CAO service.
- An administration console 120 to allow HPMN 102's operator to configure service node 104. In an exemplary aspect, administration console 120 is a web-based Graphical User Interface (GUI) system containing a set of applications which provides a system administrator of the application to manage and configure a system database. An example of the application is a Black List management. This application allows the administrator to define or alter a list of subscribers who are barred from using the CAO service. Another example is the reports generated by service node 104. The reports shows the statistics about CAO service usage like the number of calls or SMS requests received by the application, number of requests accepted and no. of calls connected.

In an aspect of the present invention, service node 104 communicates with GMSC/SSF 110 over ISIP and MAP protocols. Service node 104 further sends SMS to SMSC 112 over a Transmission Control Protocol (TCP) / Internet Protocol (IP). Additionally, service node 104 communicates with USSD gateway 114 over an XML and a Short Message Peer-to-Peer (SMPP) protocol. Service node 104 communicates with prepaid SCP 116 over CAP and Intelligent Network Application Part (INAP) protocols. Further, service node 104 communicates with O&M console 118 over a Simple Network Management Protocol (SNMP).
FIG. 2 illustrates a flowchart depicting the CAO service, in accordance with an aspect of the present invention. At step 202, service node 104 establishes mobile communication between calling party 106 and called party 108 after receiving a response, from calling party 106, for a request for mobile communication made by calling party 106. In an aspect of the present invention, service node receives a MT call request from calling party 106 to called party 108, and accordingly charge calling party 106 for the mobile communication using an interface provided by service node 104. In an aspect of the present invention, the interface is an USSD interface. In another aspect of the present invention, the interface is an SMS interface. In yet another aspect of the present invention, the interface is an Interactive Voice Response (IVR) interface.

After receiving the MT call request at called party 108, service node 104 sends a notification to calling party 106 for it to respond to the request via the interface provided by service node 104. In various aspects of the present invention, calling party 106 may use USSD, SMS or IVR as the interface to respond. In one aspect of the present invention, the response of calling party 106 is an approval to bear the charges of the requested mobile communication. In another aspect of the present invention, the response of calling party 106 is a rejection to not bear the charges of the mobile communication.

After receiving the response from calling party 106, service node 104 notifies called party 108 about this response. When calling party 106 approves to bear the charges of the mobile communication, service node 104 establishes mobile communication between calling party 106 and called party 108. In an aspect of the present invention, service node 104 establishes the mobile communication by routing the MO call from calling party 106 via service node 104 to called party 108. In another aspect of the present invention, service node 104 configures Calling Line Identification (CLI) that is to be displayed to calling party 106 and called party 108. In an aspect of the present invention, service node 104 displays the CLI of calling party 106 to called party 108. In another aspect of the present invention, service node 104 displays a short code for service node 104 as the CLI to called party 108. Likewise, in an aspect of the present invention, service node 104 displays the
CLI of calling party 106 to called party 108. While, in another aspect of the present invention, service node 104 displays the short code for service node 104 as the CLI to called party 108. In one aspect of the invention, HPMN 102 has an INAP or CAP Phase 2 protocol for terminating calls. Moreover, service node 104 uses a TICK or T-CSI to implement the CAO service.

After the mobile communication has been established between calling party 106 and called party 108, service node 104 charges calling party 106 for the established mobile communication at step 204. The process of billing calling party 106 is described later in the context of the present invention.

In order to establish mobile communication between calling party 106 and called party 108, service node 104 uses its internal modules. FIG. 3 illustrates an internal architecture of service node 104 for implementing the CAO service, in accordance with an aspect of the present invention. Service node 104 includes four functional modules: a user command interface module 302, a call setup module 304, an O&M module 306 and a Call Detail Record (CDR) aggregator module 308. User command interface module 302 provides SMS, USSD and IVR interfaces to both calling party 106 and called party 108. User command interface module 302 further provides commands that can be invoked by called party 108 to interact with service node 104. Called party 106 can invoke such commands over SMS or USSD. User command interface module 302 further includes an SMSC interface 310 and an USSD interface 312. For sending and receiving commands over SMS, SMSC interface 310 interacts with SMSC 112. When called party 106 chooses the USSD channel, USSD interface 312 interacts with USSD gateway 114 or a Home Location Register (I-ILR) 314 of HPMN 102.

Further, call setup module 304 implements all signaling and call setup functionality by interacting with GMSC/SSF 110 and prepaid SCP 116 using standard signaling protocols. Call setup module 304 further includes an ISUP interface 316, an IN interface 318, a MAI5 interface 320 and an Interactive Voice Response (IVR) interface 322. ISUP interface 316 interacts with GMSC/SSF 110 for processing ISUP, IN and CAMEL based call setup and tear-down messages. IN interface 318 interacts with prepaid SCP 116 using IN and CAMEL protocols for real-time charging of calls.
MAP interface 320 interacts with HLR 314 using MAP protocol for call setup. 1VR interface 322 is used by calling party 106 and called party 108 to interactively setup collect call.

O&M module 306 provides all functionality needed for operations and maintenance of service node 104. O&M module 306 supports SNMP alarms and notifications for all major events occurring in service node 104. O&M module 306 includes an SNMP interface 324 that exposes all critical parameters to O&M console 118, which uses these parameters for monitoring and querying for health of service node 104. O&M module 306 further includes an administrative user interface 326 that is a bundle of web-based graphical user interface that drive administration applications which can be used by service node 104’s administrator to configure and control service node 104’s data and features.

Furthermore, CDR aggregator module 308 is responsible for generating CDRs for all calls handled by service node 104. CDR aggregator module 308 aggregates all call events into CDRs, and then it updates them into a database 330. The CDR files can then be generated from the database. In an aspect of the present invention, various kinds of reports are generated using the CDR for further analysis. These CDRs can be used to hand-off call data to a mediation system 328 for billing purpose.

In an aspect of the present invention, database 330 stores a list of valid subscribers (e.g., called party 108) that have registered for the CAO service. In an aspect of the present invention, database 330 maintains a blacklist of VPMNs that charge airtinie for MT calls to called party 108, when it is roaming in the VPMN. In another aspect of the present invention, database 330 maintains a blacklist of calling parties whose requests for the mobile communication is blocked or rejected by called parties. In yet another aspect of the present invention, database 330 maintains a white list of calling parties for which mobile communication is established without the requirement of the approval from calling party 106.

In an aspect of the present invention, when called party 108 is a prepaid subscriber and he does not have sufficient balance to receive calls, or when called party 108 does not want to bear the expense of the MT roaming call; called party 108
initiates CAO service using the interface provided by service node 104. In another aspect of the present invention, both prepaid and postpaid called parties are allowed to initiate CAO service using service node 104. In such a case, the data associated with both prepaid and postpaid called party is provisioned into service node 104. In one aspect of the invention, outbound roaming called party 108 can set a temporary Forward-to-Number (FTN) to avoid being charged for roaming IDD MT call leg, instead just pays for the IDD leg. Also, the temporary FTN charge can also be levied to the calling party 106.

Hereinafter, calling party 106 and called party 108 will be interchangeably referred to as party A and party B, respectively.

FIG. 4 illustrates a flow diagram for implementing the CAO service in a scenario where calling party pays for the MFC roaming leg, when called party is postpaid without SCP and calling party is postpaid, in accordance with an aspect of the present invention. Party B receives an MT call from party A, through IAM (A,B) message at GMSC 110. The GMSC furthers a SRI query for party B to HLR 314 of party B. HLR 314 returns the T-CSI information in SRI-AC:K response. The T-CSI of party B is provisioned dynamically to route the calls to service node 104. Thereafter, GMSC 110 sends an IDP (A, B, IMS1-B) message that reaches service node 104. Service node 104 again issues a SRI query on party B, suppressing its T-CSI. In return, the HLR 314 of party B sends a MSRN in SRI-ACK message. Finally, the service node 104 sends a Connect (MSRN) message to GMSC 110 and is involved in CDR operations for party A.

In another aspect of the invention, in case the calling party A pays for the MTC leg through a temporary ibrward-to-number (TFN), then the call flow remains the same as above, except that service node 104 does not send a SRI query to suppress T-CSI to HLR 314, but rather directly sends a Connect (TFN) to GMSC 110.

FIG. 5 illustrates a flow diagram for implementing the CAO service in a scenario where calling party pays for the MTC leg (TFN or MSRN), when called party B is postpaid with SCP and calling party A is also postpaid, in accordance with an aspect of the present invention. Party B receives an MT call from party A through
1AM (A,B) from GMSC 110. The GMSC further sends a SRI query on party B to HLR 314 of party B. The HLR 314 returns the T-CSI in SRI-ACK message. Thereafter, GMSC 110 sends an IDP (A, B, IMSI-B) message that reaches service node 104. As party B is postpaid with an SCP, service node 104 relays the IDP message to SCP for party B. SCP completes its operations with service node 104, which then sends a Connect (TFN, MSRN) message to GMSC 110 and get involved in CDR operations on party A.

In another aspect of the present invention, if party B is pre-paid with or without SCP, while party A is post-paid, then the call flow remains same as above, with service node 104 sending a Connect (NN) message to GMSC 110.

FIG. 6 illustrates a flow diagram for implementing the CAO service in a scenario where calling party pays for the MTC leg (TNF or MSRN), when called party B is postpaid with or without SCP and calling party A is pre-paid, in accordance with an aspect of the present invention. Party B receives an MT call from party A through 1AM (A,B) from GMSC 110. The GMSC further sends a SRI query on party B to HLR 314 of party B. The HLR 314 returns the T-CSI in SRI-ACK message. Thereafter, GMSC 110 sends an IDP (A, B, IMSI-B) message that reaches service node 104. As party B is prepaid, service node 104 sends a SRI query message on party A, and receives the O-CSI for party A in SRI-ACK response. Thereafter, service node 104 sends the IDP (A, B, IMSI-A) message to the SCP. The SCP completes its operations with service node 104, which then sends a Connect (NN) to GMSC 110 and gets involved in CDR operations on party A.

In another aspect of the present invention, if both parties A and B are prepaid, with party B being with or without SCP, then the above call remains the same, except the following. When service node 104 receives the IDP (A, B, IMSI-B) message, it first relays this message to the SCP of party B and completes the SCP operations. Thereafter, the call flow continues similar to above, from service node 104 sending an SRI query on party A and so on.

As discussed earlier, to establish a call through CAO service, service node 104 needs to route the MO calls from party A to party B through itself. In this aspect,
service node 104 initiates an ISUP IAM call to GMSC/SSF 110 with CdPA as party B's number with a prefix '*', and CgPA as party A's number. Thereafter, GMSC/SSF 110 sends the IDP message to service node 104, based on the prefixed CdPA. Subsequently, upon receiving the IN IDP message with the prefixed party B's number, service node 104 issues a MAP Send Routing information (SRI) message with suppressed Terminating CAMEL Subscription Information (T-CS1) and party B's Mobile Station International Subscriber Directory Number (MSISDN-B) to HLR 314, to obtain a Mobile Station Routing Number (MSRN) associated with party B (MSRN-B).

Thereafter, once MSRN-B is obtained, service node 104 issues an IN IDP message to pre-paid SCP 116 with CdPA as MSRN-B and CgPA as party A's number. In an aspect of the present invention, this IN IDP message enables pre-paid SCP 116 to charge party A appropriately for the MT call on the MSRN-B. When party A has enough credit in his a prepaid account then pre-paid SCP 116 responds with an IN Continue (CUE) message and Request Report Basic call state model event (RRB) message. Thereafter, service node 104 sends an IN Connect (CON) message to GMSC/SSSF 110 with CdPA as MSRN-B and CgPA as party A's number. Upon receiving the IN CON message, GMSC/SSF 110 issues an ISUP IAM message with CdPA as MSRN-B and CgPA as party A's number. When party B is reachable and answers the ISUP IAM call, service node 104 receives answer message relayed through GMSC/SSF 110. In an aspect of the present invention, service node 104 is equipped with voice trunks and plays an announcement to party A, while it routes the MO call to the party B.

In an aspect of the present invention, when calling party A is off-net, then the CAO service allows the calling party A to call a premium number that determines the rate to be charged to calling party A. For example, when the calling party A has tried just one called party B who asked for paying the MTC leg of call within a configurable interval, then the called party B will be selected for confirmation or without prompt to the calling party A for selection; otherwise the calling party A will be prompt for a selection of the called parties. When non-selected or not confirmed, the calling party A is prompted for a new called party.
In another aspect of the present invention, when calling party A is on-net, then if the calling party A is postpaid, then service node 104 generates a postpaid billing CDR on the calling party A. However, if the calling party A is prepaid, the CAO will interface with calling party A's Pre-Paid System (PPS) by obtaining the O-CSI of calling party A, as explained in above description.

In accordance with various aspects of the invention, the called party, outbound roamer can subscribe to CAO service anywhere on demand via USSD. For example:

- #123#1#, activate Announcement
- #123#2#, not paying
- #123#3#TFN#, set TFN

- #123#4#A-party#, for A-party to call him and pay for the call
- #123#5#A-party#, if A-party calls, ask him to pay
- #123#6#A-party#, if A-party calls, accept pay for roaming

- #123#7#A-party#, block A-party's call without voicemail
- #123#8#A-party #, block A-party's call while allowing voicemail

In various aspects, multiple combinations from above can be used. E.g. called party B sets TFN, then does not pay or activate announcement, but asks calling party to pay for it. Alternatively, there can be a menu choice for selection, e.g. #123# to get an interactive menu. The outbound roamer can also white-list some callers to accept roaming MTC leg and blacklist some callers to ask to pay for roaming MTC leg of calls. The outbound roamer can also block callers with or without voicemail. Moreover, there can also be a web interface to help with settings.

In accordance with an aspect, when outbound roamer (party B) is not paying for MT leg of the call, the CAO service node 104 can play an announcement like "roamer out of balance, to reach the roamer, u pay". The cost could be MT roaming IDD or just forward IDD leg. Alternatively, service node may prompt for digits collection, e.g., "enter 1 to accept payment" for on net calls. For off-net calls, Play Announcement ("Dial the premium number XXX"). There can be one premium number for uniform cost or one for roaming and one for IDD leg. Whenever caller
does not continue or follow up within a short time configurable $T$, a missed call alert will be generated and the call is released.

The present invention for CAO service deals with both on-net and off-net callers. It also handles the roaming situations where the called party B may preset the paying conditions for the calling party A. It also deals with roaming situation where called party B indicates a forward-to-number and also preset the paying conditions for the calling party A.

In summary, when outbound roamer is not paying for the MT call, the GMSC does not make SRI query, but rather by the solution (for MSRN or TFN). There can be still other SCPs involved (e.g. VMCC) even prepaid SCP need not be involved. The final Camel Connect will be issued by the solution service node from the CAO solution and the service node hence controls the billing of the calling party A. When the outbound roamer is paying for the call, the service node bypasses the Camel T-CSI to the real SCPs (e.g. VMCC) otherwise just continue (where no SCP exists). The CAO service then no longer needs to be involved.

It will be apparent to a person skilled in the art, that the present invention can also be applied to Code Division Multiple Access (CDMA)/American National Standards Institute # 41D (ANSI-41D), and various other technologies such as, but not limited to, VoIP, WiFi, 3GSM and inter-standard roaming. In one exemplary case, a CDMA outbound roamer travels with an HPMN CDMA handset. In another exemplary case, the CDMA outbound roamer travels with an HPMN GSM SIM and a GSM handset. In yet another exemplary case, GSM outbound roamer travels with an HPMN CDMA RUIM and a CDMA handset. To support these variations, gateway 104 and client 106 will have a separate SS7 and network interfaces, corresponding to both the HPMN and FPMN networks. It will also be apparent to a person skilled in the art that these two interfaces in different directions may not have to be the same technologies. Moreover, there could be multiple types of interface in both directions.

An exemplary list of the mapping between GSM MAP and ANSI-41D is described in the table below as a reference.
The present invention provides a Call Assistant for managing incoming calls to outbound roamers (CAO) service for outbound roaming subscribers of an operator. With the help of CAO service, the outbound roaming called party is able to receive calls and SMS from a calling party, without paying for the MTC roaming and IDD leg of the call. The cost for this MT call is borne by the calling party. The CAO service is useful for both prepaid and post subscribers. When prepaid subscribers are out of balance and they still want to receive calls and SMSs they can use the CAO service. When postpaid subscribers do not want to spend on roaming costs for receiving incoming calls, they can use the CAO service to receive calls and SMS. The CAO service increases revenues of the HPMN operator as the calling party pays for operator's outbound roamer, when he does not wish to pay for the incoming calls and SMS (specifically when he wants to avoid airtime charges).

The present invention can take the form of an entirely hardware aspect, an entirely software aspect, or an aspect containing both hardware and software elements. In accordance with an aspect of the present invention, software, including but not limited to, firmware, resident software, and microcode, implements the invention.

Furthermore, the invention can take the form of a computer program product, accessible from a computer-usable or computer-readable medium providing program code for use by, or in connection with, a computer or any instruction execution.
system. For the purposes of this description, a computer-readable or computer usable medium can be any apparatus that can contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device.

The medium can be an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system (or apparatus or device) or a propagation medium. Examples of a computer-readable medium include a semiconductor or solid state memory, magnetic tape, a removable computer diskette, a random access memory (RAM), a read-only memory (ROM), a rigid magnetic disk and an optical disk. Current examples of optical disks include compact disk read only memory (CDROM), compact disk - read/write (CD-R/W) and Digital Versatile Disk (DVD).

A computer usable medium provided herein includes a computer usable program code, which when executed, facilitates mobile communication between a calling party and a called party, by establishing the mobile communication, via a service node, upon receiving a response from the called party for a mobile communication request made by the calling party to the service node. Further, the computer program product facilitates by the service node, charging of the called party for the established mobile communication.

The components of present system described above include any combination of computing components and devices operating together. The components of the present system can also be components or subsystems within a larger computer system or network. The present system components can also be coupled with any number of other components (not shown), such as other buses, controllers, memory devices, and data input/output devices, in any number of combinations. In addition, any number or combination of other processor-based components may be carrying out the functions of the present system.

It should be noted that the various components disclosed herein may be described using computer aided design tools and/or expressed (or represented), as data and/or instructions embodied in various computer-readable media, in terms of their behavioral, register transfer, logic component, transistor, layout geometries, and/or
other characteristics. Computer-readable media in which such formatted data and/or instructions may be embodied include, but are not limited to, non-volatile storage media in various forms (e.g., optical, magnetic or semiconductor storage media) and carrier waves that may be used to transfer such formatted data and/or instructions through wireless, optical, or wired signaling media or any combination thereof.

Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in a sense of "including, but may not be limited to." Words using the singular or plural number also include the plural or singular number respectively. Additionally, the words "herein," "hereunder," "above," "below," and words of similar import refer to this application as a whole and not to any particular portions of this application. When the word "or" is used in reference to a list of two or more items, it covers all of the following interpretations: any of the items in the list, all of the items in the list and any combination of the items in the list.

The above description of illustrated aspects of the present system is not intended to be exhaustive or to limit the present system to the precise form disclosed. While specific aspects of, and examples for, the present system are described herein for illustrative purposes, various equivalent modifications are possible within the scope of the present system, as those skilled in the art will recognize. The teachings of the present system provided herein can be applied to other processing systems and methods. They may not be limited to the systems and methods described above.

The elements and acts of the various aspects described above can be combined to provide further variations. These and other changes can be made in light of the above detailed description.

Other Variations

Provided above for the edification of those of ordinary skill in the art, and not as a limitation on the scope of the invention, are detailed illustrations of a scheme for charging a called party for the mobile communication initiated by a calling party. Numerous variations and modifications within the spirit of the present invention will
of course occur to those of ordinary skill in the art in view of the aspects that have been disclosed. For example, the present invention is implemented primarily from the point of view of GSM mobile networks as described in the aspects. However, the present invention may also be effectively implemented on GPRS, 3G, CDMA, WCDMA, WiMax etc., or any other network of common carrier telecommunications in which end users are normally configured to operate within a "home" network to which they normally subscribe, but have the capability of also operating on other neighboring networks, which may even be across international borders.

The examples under the system of present invention detailed in the illustrative examples contained herein are described using terms and constructs drawn largely from GSM mobile telephony infrastructure. However, use of these examples should not be interpreted as limiting the invention to those media. The system and method can be of use and provided through any type of telecommunications medium, including without limitation: (i) any mobile telephony network including without limitation GSM, 3GSM, 3G, CDMA, WCDMA or GPRS, satellite phones or other mobile telephone networks or systems; (ii) any so-called WiFi apparatus normally used in a home or subscribed network, but also configured for use on a visited or non-home or non-accustomed network, including apparatus not dedicated to telecommunications such as personal computers, Palm-type or Windows Mobile devices; (iii) an entertainment console platform such as Sony Playstation, PSP or other apparatus that are capable of sending and receiving telecommunications over home or non-home networks, or even (iv) fixed-line devices made for receiving communications, but capable of deployment in numerous locations while preserving a persistent subscriber id such as the eye2eye devices from Dlink; or telecommunications equipment meant for voice over IP communications such as those provided by Vonage or Packets.

In describing certain aspects of the system under the present invention, this specification follows the path of a telecommunications call, from a calling party to a called party. For the avoidance of doubt, such a call can be a normal voice call, in which the subscriber telecommunications equipment is also capable of visual, audiovisual or motion-picture display. Alternatively, those devices or calls can be for text, video, pictures or other communicated data.
In the foregoing specification, specific aspects of the present invention have been described. However, one of ordinary skill in the art will appreciate that various modifications and changes can be made without departing from the scope of the present invention as set forth in the claims below. Accordingly, the specification and the figures are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of present invention. The benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur, or to become more pronounced, are not to be construed as a critical, required, or essential feature or element of any or all of the claims.
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>CAMEL</td>
<td>Customized Application for Mobile Enhanced Logic</td>
</tr>
<tr>
<td>CAP</td>
<td>CAMEL Application Part</td>
</tr>
<tr>
<td>CdPA</td>
<td>Called Party Address</td>
</tr>
<tr>
<td>CgPA</td>
<td>Calling Party Address</td>
</tr>
<tr>
<td>CDR</td>
<td>Call Detail Record</td>
</tr>
<tr>
<td>CIMD2</td>
<td>Computer Interface to Machine Distribution, version 2</td>
</tr>
<tr>
<td>CLI</td>
<td>Calling Line Identification</td>
</tr>
<tr>
<td>CSI</td>
<td>Camel Subscription Information</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer Relationship Management</td>
</tr>
<tr>
<td>DTMF</td>
<td>Dual Tone Multi Frequency</td>
</tr>
<tr>
<td>ECF</td>
<td>Early Call Forwarding</td>
</tr>
<tr>
<td>ERB</td>
<td>Event Report Basic call state model</td>
</tr>
<tr>
<td>GMSC</td>
<td>Gateway MSC</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Services</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
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<tr>
<td>GT</td>
<td>Global Title</td>
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<tr>
<td>HLR</td>
<td>Home Location Register</td>
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<tr>
<td>HPMN</td>
<td>Home Public Mobile Network</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hypertext Transfer Protocol</td>
</tr>
<tr>
<td>IAM</td>
<td>Initial Address Message</td>
</tr>
<tr>
<td>IDP</td>
<td>Initial Destination Point</td>
</tr>
<tr>
<td>IN</td>
<td>Intelligent Network</td>
</tr>
<tr>
<td>INAP</td>
<td>Intelligent Network Application Part</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>ISD</td>
<td>MAP Insert Subscriber Data</td>
</tr>
<tr>
<td>ISUP</td>
<td>ISDN User Part</td>
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<tr>
<td>IVR</td>
<td>Interactive Voice Response</td>
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<tr>
<td>LCF</td>
<td>Late Call Forwarding</td>
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<tr>
<td>LUP</td>
<td>Location Update</td>
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<tr>
<td>MAP</td>
<td>Mobile Application Part</td>
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<tr>
<td>MO</td>
<td>Mobile Originated</td>
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<tr>
<td>MSC</td>
<td>Mobile Switching Center</td>
</tr>
<tr>
<td>MSISDN</td>
<td>Mobile Station International Subscriber Directory Number</td>
</tr>
<tr>
<td>MSRN</td>
<td>Mobile Station Roaming Number</td>
</tr>
<tr>
<td>MT</td>
<td>Mobile Terminated</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
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<tr>
<td>PC</td>
<td>Point Code</td>
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<tr>
<td>RRB</td>
<td>Request Report Basic call state model event</td>
</tr>
<tr>
<td>SC</td>
<td>Short Code</td>
</tr>
<tr>
<td>SCP</td>
<td>Signaling Control Point</td>
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<tr>
<td>SCCP</td>
<td>Signal Connection Control part</td>
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<tr>
<td>SME</td>
<td>Short Message Entity</td>
</tr>
<tr>
<td>SMPP</td>
<td>Short Message Peer-to-Peer</td>
</tr>
</tbody>
</table>
### Technical references, each of which is incorporated by reference herein:

5  
GSM 902 on MAP specification  
Digital cellular telecommunications system (Phase 2+);  
Mobile Application Part (MAP) Specification  
(3GPP TS 09.02 version 7.9.0 Release 1998)

10  
GSM 378 CAMEL Architecture, Release 1998

GSM 978 CAMEL Application Protocol, Release 1998

GSM 340 on SMS

15  
Digital cellular telecommunications system (Phase 2+);  
Technical realization of the Short Message Service (SMS);  
(GSM 03.40 version 7.4.0 Release 1998)

Q1214-Q1218 on Intelligent Networks

20  
Q701-704 on SS7 MTP
Q711-Q714 on SS7 SCCP

TD.35 NRTRDE Format for Fraud information

FF.18 NRTRDE Business Requirements

ETSI CS domain charging documents: TS 12.05, TS 32.005, TS 32.205, TS 32.298


ETS 300 374-1 Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (SNAP); Part 1: Protocol specification

EN 301 140-1 Intelligent Network (IN); intelligent Network Application Protocol (INAP); Capability Set 2 (CS2): Part 1: Protocol specification

Jiang DCG 2005 Dynamic originating CAMEL approach for Implementing Call Control Services for Inbound Roamers, United States Provisional Patent Application Serial No. 60/679,444;

Jiang et al 2003 Traffic Redirection

GSM 379 on CAMEL Support of Optimal Routing (SOR)

GSM 318 on CAMEL Basic Call Handling

ITU-T Recommendation Q.1214 (1995), Distributed functional plane for intelligent network CS-1;

ITU-T Recommendation Q.1218 (1995), Interface Recommendation for intelligent network CS-1;
ITU-T Recommendation Q.762 (1999), Signaling system No. 7 - ISDN user part
genral functions of messages and signals;

ITU-T Recommendation Q.763 (1999), Signaling system No. 7 – ISDN user part
formats and codes;

ITU-T Recommendation Q.764 (1999), Signaling system No. 7 - ISDN user part
signaling procedures;

ITU-T Recommendation Q.766 (1993), Performance objectives in the integrated
services digital network application;

ITU-T Recommendation Q.765 (1998), Signaling system No. 7 - Application
transport mechanism;

ITU-T Recommendation Q.769.1 (1999), Signaling system No. 7 – ISDN user part
enhancements for the support of Number Portability
CLAIMS

1. A method of facilitating mobile communications, the method comprising:
   establishing a mobile communication, via a sendee node, between a calling party and a called party, upon receiving a response from the calling party to a mobile communication request made by the calling party to the service node; and
   facilitating, via the service node, charging of the calling party for the established mobile communication.

2. The method of claim 1, wherein the response is an approval from the calling party to bear charges for the established mobile communication.

3. The method of claim 1, wherein if the response from the calling party is a rejection, the service node notifies the called party about the rejection of the mobile communication request made by the calling party.

4. The method of claim 1, wherein the calling party makes the request to the service node by sending the called party's number using an interface.

5. The method of claim 4, wherein the interface is one of an Unstructured Supplementary Service Data (USSD) interface, a Short Message Service (SMS) interface and an Interactive Voice Response (IVR) interface.

6. The method of claim 1, wherein the calling party is one of an on-net subscriber and an off-net subscriber.

7. The method of claim 6, wherein the calling party is an off-net subscriber and calls a premium number to reach the called party, the premium number determining the charge to the calling party for establishing the mobile communication.

8. The method of claim 6, wherein the calling party is an on-net subscriber and calls the called party directly, and is charged for establishing the mobile communication.
communication through its Signaling Control Point (SCP) or Pre-Paid System (PPS).

9. The method of claim 1, wherein the mobile communication is established using one of a Mobile Station Roaming Number (MSRN) and a Toll Free Number (TfN) for the called party.

10. The method of claim 1, wherein the calling party is one of a prepaid subscriber and a postpaid subscriber, and the called party is one of a prepaid subscriber, a postpaid subscriber and a roaming subscriber.

11. The method of claim 1, wherein the mobile communication is established by routing a Mobile Originated (MO) call initiated by the calling party via the service node to the called party.

12. The method of claim 11, wherein routing the MO call comprises:

   initiating, via the service node, an ISDN User Part (ISUP) Initial Address Message (IAM) call to a Gateway Mobile Switching Center (GMSC)/Service Switching Function (SSF), associated with a Home Public Mobile Network (FIPMN) of the called party, with Called Party Address (CdPA) as called party number and Calling Party Address (CgPA) as calling party number;

   receiving, at the service node, an Initial Destination Point (IDP) message from the GMSC/SSF;

   obtaining, via the service node, a Mobile Station Routing Number (MSRN) associated with the called party;

   issuing, via the service node, an IDP message to a prepaid Service Control Point (SCP), associated with the FIPMN, with CdPA as the MSRN and CgPA as the calling party number; when the calling party is a prepaid subscriber;

   initiating, via the service node, a connect message to the GMSC/SSF with CdPA as the MSRN and CgPA as the calling party number; and

   receiving, at the service node, an answer message, wherein the answer message indicates routing of the MO call to the called party.
13. The method of claim 1, wherein the called party subscribes to Call Assistant for managing Out-bound roamers (CAO) service via a USSD interface.

14. The method of claim 1, wherein the service node maintains a white list of the calling parties for which mobile communication is established without a requirement of approval from the called party.

15. The method of claim 1, wherein the calling party and the called party are associated with one of a same operator and a different operator.

16. The method of claim 1, wherein the service node interacts with a billing system to facilitate charging the calling party for the call.

17. The method of claim 1, wherein the service node maintains a blacklist of Visited Public Mobile Networks (VPMNs) that charge airtime of Mobile Terminated (MT) calls to the called party.

18. The method of claim 1, wherein the service node maintains a blacklist of the calling parties whose requests for the mobile communication are blocked or rejected by the called parties.

19. A system for facilitating mobile communication, the system comprising:
   a service node for establishing a mobile communication between the calling party and a called party upon receiving a response from the calling party to a mobile communication request made by the called party to the service node;
   wherein the service node charges the calling party for the established mobile communication.

20. The system of claim 19, wherein the service node is deployed in a HPMN of the called party.
21. The system of claim 19, wherein the calling party and the called party are associated with a same operator or a different operator.

22. The system of claim 19, wherein the calling party is one of a pre-paid subscriber and a post-paid subscriber, and the called party is one of a pre-paid subscriber, a post-paid subscriber and a roaming subscriber.

23. The system of claim 19, wherein the service node establishes the mobile communication by routing the MO call initiated by the calling party via the service node to the called party.

24. The system of claim 19, wherein the calling party and the called party are present in at least one of a HPMN and a VPMN.

25. The system of claim 19, wherein the service node maintains a blacklist of VPMNs that charge airtime of MT calls to the called party.

26. The system of claim 19, wherein the service node maintains a blacklist of the calling parties whose requests for the mobile communication are blocked or rejected by the called parties.

27. The system of claim 19, wherein the service node maintains a white list of the calling parties for which the mobile communication is established and for which no approval is required from the called party.

28. A computer program product comprising a computer usable medium having control logic stored thereon for causing a computer to exchange user-generated community information, the control logic comprising:

   computer readable program code means for establishing a mobile communication, via a service node, between a calling party and a called party, upon receiving a response from the calling party to a mobile communication request made by the calling party to the service node; and

   computer readable program code means for facilitating, via the service node, charging of the calling party for the established mobile communication.
Call Assistant for managing incoming calls to Outbound Roamers

FIG. 1
Establish mobile communication between a calling party and a called party by a service node.

Charge by the service node for the established mobile communication.
Calling party paying for the MTC leg roaming - B-party is post-paid without SCP and A-party is post-paid

Service node is involved further for CDR interactions
On A-party

FIG. 4

Connect(MSRN), CDR operations

SR(B) = T-CSI-Suppress
SRI-ACK(MSRN)

SRI-ACK(T-CSI)
IDP(A,B,IMSI-B)

SR(B)

314 HLR

110 GMSC

IAM(A,B)

116 SCP

104 Service Node
Calling party paying for the MTC leg TFN/MSRN - B-party is prepaid with or without SCP and A-party is post-paid

SCP

116

Service Node

104

IDP(A,B,IMSI-B)

SCP operations

Service node is involved further for CDR interactions on A-party

Relayed

Omit MSRN procedure and just use NN

FIG. 5

Connect(NN=TFN/MSRN)

GMSC

110

IAM(A,B)

HLR

314

SRI-ACK(T-CS)

IDP(A,B,IMSI-B)

SRI(B)
Calling party paying for the MTC leg TFN/MSRN - B-party is post-paid with or without SCP and A-party is prepaid

FIG. 6