



- (51) **International Patent Classification:**
H04M 11/00 (2006.01) *H04W 76/10* (2018.01)
- (21) **International Application Number:**
PCT/IB2018/057482
- (22) **International Filing Date:**
27 September 2018 (27.09.2018)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
201741034259 27 September 2017 (27.09.2017) IN
- (71) **Applicant: L&T TECHNOLOGY SERVICES LIMITED** [IN/IN]; DLF IT SEZ Park, Block 3, 2nd Floor, 1/124, Mount Poonamallee Road, Ramapuram, Chennai 600089 (IN).
- (72) **Inventors: PRASAD CS, Raghavendra;** House No.:314, Sunflower apartments, 1st J main, Kasturi Nagar, Bangalore 560043 (IN). **R BHIDE, Manjunath;** House No.:8, 1st Main, SMR Layout Abbigerre, Bangalore 560090 (IN). **YA-**

DAV, Pawan; SA8 Saikrishna appt, near Macaulay school, near sompura gate, off sarjapur road, Bangalore 562125 (IN). **P BODAS, Nitin;** 5th floor, L&T Technology services, Bulding No.3, Mindspace, Airoli, Mumbai 400708 (IN).

- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

(54) **Title:** METHOD AND SYSTEM FOR MANAGING VOICE CALLING

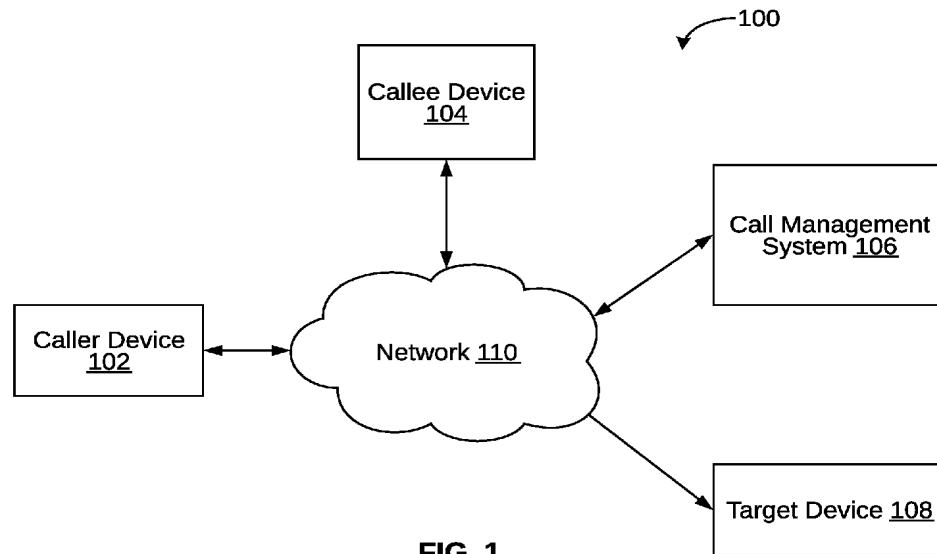


FIG. 1

(57) **Abstract:** A method for managing a call connection is disclosed. The method may include receiving a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee. The method may further include detecting a failure in establishing the call connection, and a triggering of one or more criteria. The method may further include providing a plurality of options to the caller in response to detecting, such that each of the plurality of options is configured for establishing a communication session between the caller device and a target device associated with a target user. The method may further include receiving an input from the caller on the plurality of options, and establishing the communication session between the caller device and the target device based on the input.



TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*

METHOD AND SYSTEM FOR MANAGING VOICE CALLING**DESCRIPTION****Technical Field**

[001] This disclosure relates generally to voice calling, and more particularly to method and system for managing voice calling.

Background

[002] Voice calling is an important and one of the most widely used way of communication. Voice calling may be established when one user (caller) sends a request to another user (callee), and the callee, upon receiving the request, accepts the request. However, in some cases, the call may not be established for one or more reasons. Further, in cases of emergency, the caller may make numerous attempts by sending repeated requests but may fail to establish a call.

[003] Some techniques are known that allow the caller to leave a voice message for the called party in case a voice call between the caller and the callee could not be established. Some other techniques are known that allow a caller to configure multiple calling options to reach a callee in case one or more calling options fail to establish a call between the caller and callee for example, a caller may store a multiple contact numbers of the callee. The technique provides for automatically dialing the remaining of the contact numbers of the callee in case the call is not established using the first dialed contact number.

[004] However, there may be situations when the caller may not able to reach to the callee through any contacting means, such as in situations when the callee's device is dysfunctional or switched off. In such situations, the caller may try to reach to the callee via reaching to another user related to or accessible to the callee (such, as friend or the callee, or spouse of the callee, or a colleague of the callee, etc.). However, in situations when the caller does not possess contact information of any such user, caller may be able unable to reach to the callee. Delays in reaching to the callee may lead to undesired consequences for the caller.

SUMMARY

[005] In one embodiment, a method for managing voice calling is disclosed. In one embodiment, the method may include receiving a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee. The method may further include detecting a failure in establishing the call connection and a triggering of one or more criteria, such that the one or more criteria may be predefined by the callee. The method may further include providing a plurality of options to the caller in response to detecting. Each of the plurality of options may be configured for establishing a communication session between the caller device and a target device associated with a target user, such that the target user may be from a list of target users predefined by the callee or generated by the call management system. The method may further include receiving an input from the caller through the caller device on the plurality of options. The method may further include automatically establishing the communication session between the caller device and the target device based on the input.

[006] In another embodiment, a call management system for managing voice calling is disclosed. The call management system includes a processor and a memory communicatively coupled to the processor, wherein the memory stores processor instructions, which, on execution, causes the processor to receive a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee. The processor instructions further cause the processor to detect a failure in establishing the call connection and a triggering of one or more criteria, wherein the one or more criteria is predefined by the callee. The processor instructions further cause the processor to provide a plurality of options to the caller in response to detecting. Each of the plurality of options may be configured for establishing a communication session between the caller device and a target device associated with a target user, such that wherein the target user may be from a list of target users predefined by the callee or generated by the call management system. The processor instructions further cause the processor to receive an input from the caller through the caller device on the plurality of options. The processor instructions further cause the processor to automatically establish the communication session between the caller device and the target device based on the input.

[007] In yet another embodiment, a non-transitory computer-readable storage medium is disclosed. The non-transitory computer-readable storage medium has instructions stored thereon, a set of computer-executable instructions causing a computer comprising one or more processors to perform steps comprising receiving a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee; detecting a failure in establishing the call connection and a triggering of one or more criteria, such that the one or more criteria is predefined by the callee; in response to detecting, providing a plurality of options to the caller, such that each of the plurality of options is configured for establishing a communication session between the caller device and a target device associated with a target user, and such that the target user is from a list of target users predefined by the callee or generated by the call management system; receiving an input from the caller through the caller device on the plurality of options; and automatically establishing the communication session between the caller device and the target device based on the input.

[008] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention, as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[009] The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and, together with the description, serve to explain the disclosed principles.

[010] **FIG. 1** is a block diagram illustrating an environment for managing voice calling, in accordance with an embodiment;

[011] **FIG. 2** is a block diagram of a call management system for managing voice calling, in accordance with an embodiment;

[012] **FIG. 3** is a flowchart of a method for managing voice calling, in accordance with an embodiment;

[013] **FIG. 4** is a flowchart of a detailed method for managing voice calling, in accordance with an embodiment; and

[014] **FIG. 5** is a flowchart of a method for managing voice calling, in accordance with another embodiment.

DETAILED DESCRIPTION

[015] Exemplary embodiments are described with reference to the accompanying drawings. Wherever convenient, the same reference numbers are used throughout the drawings to refer to the same or like parts. While examples and features of disclosed principles are described herein, modifications, adaptations, and other implementations are possible without departing from the spirit and scope of the disclosed embodiments. It is intended that the following detailed description be considered as exemplary only, with the true scope and spirit being indicated by the following claims. Additional illustrative embodiments are listed below.

[016] In one embodiment, an environment 100 for managing voice calling is illustrated in the FIG. 1, in accordance with an embodiment. The system 100 may include a caller device 102, a callee device 104, a call management system 106, and a target device 108. It may be noted that the caller device 102 may be associated with a caller, the callee device 104 may be associated with a callee, and the target device 108 may be associated with a target user. The caller device 102, the callee device 104, and the target device 108 have capability of establishing a communication sessions between the caller device 102 and the callee device 104, or between the caller device 102 and the target device 108. In particular, the caller device 102 may have a capability to send a request for establishing a communication session. Further, each of the callee device 104 and the target device 108 may have a capability to receive the request from the caller device 102. Examples of the caller device 102, the callee device 104, and the target device 108 may include, but are not limited to, an analog telephone device, a smartphone, a mobile phone, a desktop, a laptop, a notebook, a tablet, or the like.

[017] The caller device 102 may send a request to the callee device 104 for establishing the call connection between the caller device 102 and the callee device 104. However, in some cases, a failure in establishing the call connection between the caller device 102 and the callee device 104 may be detected. In such cases, a request may be then automatically sent to a target device 108. Accordingly, a call connection may be established between the caller device 102 and the target device 108.

[018] When the caller device 102 sends a request for establishing a call connection, the call management system 106 may receive the request from the caller device 102. The call management system 106 may further detect a failure in establishing the call connection. The call management system 106 may further detect a triggering of one or more criteria. It may be noted that the one or more criteria may be predefined by the callee while registering with the call management system.

[019] Upon detecting the failure in establishing the call connection and a triggering of the one or more criteria, the call management system 106 may provide a plurality of options to the caller. In some embodiments, the options may be provided to the caller through the caller device 102. It may be noted that each of the plurality of options may be configured for establishing a communication session between the caller device 102 and the target device 108. In other words, if an attempt of establishing a call connection between the caller device 102 and the callee device 104 fails and predefined criteria are met, the call management system 106 may then automatically attempt to establish a communication session between the caller device 102 and the target device 108. The communication session may include one of a call connection, a text message, or a voice message. As mentioned earlier the target device 108 may be associated with a target user. It may be noted that the target user may be from a list of target users. In some embodiments, the list of target users may be predefined by the callee. Further, in some embodiments, the list of target users may be generated by the call management system 106. Additionally, in some embodiments, a type of communication session between the caller device 102 and the target device 108 may be predefined by the callee or may be determined by the call management system. The call management system 106 may further receive an input from the caller on the plurality of options. Based on the input received, the call management system 106 may establish the communication session between the caller device 102 and the target device 108.

[020] The caller device 102, the callee device 104, the call management system 106, and the target device 108 are communicatively coupled to each other, via a network 110. The call connection may be established through analog call connection or a voice over internet protocol (VoIP) call connection. In particular, the network 110 may be a wired or a wireless network and the examples may include, but may not be limited to the fixed telephone line, Internet, Wireless

Local Area Network (WLAN), Wi-Fi, Long Term Evolution (LTE), Worldwide Interoperability for Microwave Access (WiMAX), a General Packet Radio Service (GPRS), a public switched telephone network (PSTN), and a mobile telephony network.

[021] As will be described in greater detail in conjunction with FIG. 2 to FIG. 5, in order to manage voice calling, the call management system 106 may perform various above-discussed functionalities.

[022] Referring now to FIG. 2, a block diagram of a call management system 200 (analogous to the call management system 106) configured to manage voice calling is illustrated, in accordance with an embodiment. The call management system 200 may include an input output (I/O) interface 202, a processor 204 and a memory 206. The I/O interface 202 may be configured to receive one or more data, for example, a request data for establishing a call connection between a caller device 102 and a callee device 104, inputs from the caller on the options, inputs from the callee on various criteria, and so forth. The memory 206 may be communicatively coupled to the processor 204. The processor 204 may be configured to perform one or more functions of the call management system 200 for managing voice calling. The memory 206 may store instructions that, when executed by the processor 204, cause the processor 204 to manage voice calling, as discussed in greater detail in FIG. 2 to FIG. 5.

[023] The memory 206 may be a non-volatile memory or a volatile memory. Examples of non-volatile memory, may include, but are not limited to a flash memory, a Read Only Memory (ROM), a Programmable ROM (PROM), Erasable PROM (EPROM), and Electrically EPROM (EEPROM) memory. Examples of volatile memory may include, but are not limited to Dynamic Random Access Memory (DRAM), and Static Random-Access memory (SRAM). The memory 206 may include data 210 and a data repository 212. The data 210 may include various types data (e.g., call request data, call failure data, etc.) that may be captured, processed, and/or required by the call management system 100. In some embodiments, the data may be stored within the memory 206 in the form of various data structures. Additionally, the aforementioned data 210 may be organized using data models, such as relational or hierarchical data models. The data repository 212 may store various types of data, such as data relating to one or more criteria, one or more options provided to the caller, input received from the caller, etc.

[024] In some embodiments, the call management system 200 may include modules 208 for performing various operations in accordance with the embodiments of the present disclosure. In some embodiments, the data 210 may be processed by the modules 208. In some embodiments, the modules 208 may be stored as a part of the processor 204. For example, the modules 208 may be communicatively coupled to the processor 204 for performing one or more functions of the call management system 200.

[025] In some embodiments, the modules 208 may include, without limitation, an input receiving module 214, a call connection request receiving module 216, a detection module 218, an option providing module 220, an option generating module 222, and a communication session establishing module 224. As will be appreciated by those skilled in the art, all such aforementioned modules 214–224 may be represented as a single module or a combination of different modules. Moreover, as will be appreciated by those skilled in the art, each of the modules 214–224 may reside, in whole or in parts, on one device or multiple devices in communication with each other. As used herein, the term module may refer to an application specific integrated circuit (ASIC), an electronic circuit, a processor (shared, dedicated, or group) and memory that execute one or more software or firmware programs, a combinational logic circuit, and/or other suitable components that provide the described functionality.

[026] As will be discussed later, a caller device 102 may send a request for establishing a call connection between the caller device 102 and the callee device 104. However, in some cases, a failure in establishing the call connection and a triggering of one or more criteria may be detected. In case of detection of failure and triggering of criteria, the communication session may be attempted between the caller device 102 and a target device 108 associated with a target user of the list of target users

[027] In some embodiments, the input receiving module 214 may receive the one or more criteria from the callee, as the one or more criteria may be predefined by the callee. In some embodiments, the one or more criteria may be received from the callee through the callee device 104. For example, the callee may provide the criteria by pressing buttons or using a user interface of a display screen of the callee device 104. The one or more criteria may include an identification of the caller. It may be understood that the one or more criteria may be triggered when the caller is identified to be a caller predefined by the callee. It may be further understood

that the one or more criteria may not be triggered when the caller is not identified to be a caller predefined by the callee. For example, the criteria may be triggered when the caller is identified to be a friend callee, or a colleague of the callee, or the spouse of the callee, or a parent of the callee, and so on. In another example, the callee may predefine the criteria, such that the criteria is triggered when the caller is one of the contacts stored in the callee device. In yet another example, the callee may predefine the criteria, such that the criteria is triggered when the caller belongs to a group (such, as “Family”, or “Friends”, or “Office”, etc.) created by the callee in the callee device. However, for unknown callers (i.e. callers whose contact information is not stored in the callee device 104), the one or more criteria may not be triggered. In other words, the callee may define which callers may be allowed to avail the call management facility to establish a communication session with a target user in case of failure in establishing a call request between the caller device 102 and the callee device 104.

[028] Further, the one or more criteria may include a number of attempts made by the caller to establish the call connection between the caller device 102 and the callee device 104. For example, the number of attempts may be predefined by the callee as five. Accordingly, the criteria may be triggered after the caller device 102 makes at least five attempts (requests) to establish the call connection. Further, the one or more criteria may include an elapsed time period between a first attempt by the caller device 102 to establish the call connection and a current attempt. For example, the criteria may be triggered when the elapsed time period between the first attempt by the caller device 102 and the current attempt is within 60 minutes.

[029] Returning to FIG. 2, upon detecting the failure in establishing the call connection and the triggering of the one or more criteria, the input receiving module 214 may further receive a plurality of options. It may be noted that each of the plurality of options may be configured for establishing a communication session between the caller device 102 and a target device 108 associated with a target user. It may be further noted that the communication session may include one of a call connection, a text message, or a voice message. For example, the text message may include a short messaging service (SMS), a “Whatsapp” text message, a “Facebook” text message, etc. It may be further noted that the type of communication session may be predefined by the callee or determined by the call management system 200. The target user may be from a list of plurality of target users.

[030] In some embodiments, the list of target users may be predefined by the callee. In other words, the callee may predefine certain contacts to whom the communication session request of the caller may be forwarded to in case the call connection between the caller device and the callee could not be established. By way of an example, as shown in FIG. 2, a list predefined by a callee B for a caller A1 may include a friend of the callee, a colleague of the callee, the spouse of the callee, and a parent of the callee.

[031] In some embodiments, the list of target users may be generated by the call management system 200. In some embodiments, a list of plurality of target users may be based on a spatial proximity of each of a plurality of target devices, associated with the plurality of target users, with the callee device 104. It may be understood that the spatial proximity of the target devices may be estimated using a radio-navigation system, such as Global Positioning System (GPS). Further, in some embodiments, the list of the plurality of target users may be based on relationship proximity of the target users with the callee. By way of an example, the list of the plurality of target users may include users with whom the callee is closely related to, such as the spouse, a parent, a sibling, etc. Further, in some embodiments, the list of the plurality of target users may be based on a frequency of communication (e.g., calls, messages, etc.) between each of the plurality of target devices and the callee device 104. By way of an example, the list may include the users with whom the callee frequently interacts, or in other words, the target devices associated with the users have high frequency of establishing communication sessions with the callee device 104. In some embodiments, the list of the plurality of target users may be based on an elapsed time period since a last communication between each of the plurality of target devices and the callee device 104. By way of an example, the list may include one or more users with whom the callee has last connected with.

[032] In some embodiments, the input receiving module 214 may receive from the caller an input on the plurality of options. As will be explained later, upon detection of a failure in establishing a call connection between the caller device 102 and the callee device 104, and a triggering of the one or more criteria, the caller may be provided with a plurality of options. Each of the plurality of options may be configured for establishing a communication session between the caller device 102 and the target device 108. The input received from the caller device 102

may include selection of an option for establishing a communication session with the target device 108 associated with a target user from the list of plurality of target users.

[033] In some embodiments, the caller may select an option to reach to a target user from a list of target users predefined by the callee. For example, as shown in FIG. 2, for the list of target users predefined by the callee B, the caller A1 may select one or more options from the options 1-4 to reach to a particular target user. Accordingly, the caller A1 may select option 1 for the friend of the callee B, option 2 for the colleague of the callee B, option 3 for the spouse of the callee B, and option 4 for the parent of the callee B. Similarly, caller A2 may select option 1 for the friend of the callee B and option 2 for the neighbor of the callee B.

[034] In some embodiments, the caller may select an option to reach to a target user of a list of target users generated by the call management system 200. By way of an example, the caller may select an option to reach to a target user who has nearest spatial proximity with the callee. By way of another example, the caller may select an option to reach to a target user who has closest relationship proximity with the callee. By way of another example, the caller may select an option to reach to a target user with whom the callee frequently interacts. By way of another example, the caller may select an option to reach to a target user whom the callee has last connected with.

[035] Further, in some embodiments, the input received by the input receiving module 214 from the caller 102 on the plurality of options may include an ordered selection of a set of options from the plurality of options. In other words, the input receiving module 214 may receive two or more inputs from the caller in an order. It may be noted that when a communication session could not be established with a target user corresponding to a first option, the call management system may then attempt to establish the communication session with target users corresponding to the remaining options, in the order selected by the caller. By way of an example, the caller A1 may select option 1 (Friend) and option 3 (Spouse) in the given order. Accordingly, first an attempt is made to establish a communication session between the caller device 102 and the friend's (option 1) device. When this communication session is not established, then another attempt is made to establish a communication session between the caller device 102 and the spouse's (option 3) device.

[036] In some embodiments, the input received from the caller may be stored. The input received from the caller may be stored in a data repository 212. The stored input may be used subsequently in managing voice calling between the caller device 102 and the callee device 104 upon detecting the failure in establishing the call connection between the caller device 102 and the callee device 104.

[037] The call connection request receiving module 216 may receive a request from the caller for establishing the call connection between the caller device 102 and the callee device 104. The detection module 218 may detect a failure in establishing the call connection. The detection module 218 may further detect a triggering of the one or more criteria. It may be noted that the failure in establishing the call connection between the caller device 102 and the callee device 104 may include an inability of a callee to accept a call connection request. By way of an example, the callee may be busy in some work and may deliberately ignore the call request. By way of another example, the callee may not realize the call request being received by the callee device 104, as the callee device 104 may be on a silent mode, or the callee device 104 may be lying in a purse. The failure in establishing the call connection may further include an inability of a communication network to establish the call connection. By way of an example, the callee device 104 may be out of network coverage. The failure in establishing the call connection may further include an inability of the callee device 104 to receive the call connection request. By way of an example, the callee device 104 may be switched off (e.g., due to inadequate battery power), or the callee device 104 may be engaged in another call connection. As discussed above, the one or more criteria may include a list of selected callers that may access the call management facility established by the callee, a criteria set for each of the selected callers from the list, and so forth. In other words, the detection module 218 may detect an occasion when there is a failure in establishing the call connection and one or more predefined criteria is triggered.

[038] The option providing module 220 may provide a plurality of options to the caller. In some embodiments, the option providing module 220 may provide the plurality of options upon detecting a failure in establishing the call connection and a triggering of one or more criteria. Each of the plurality of options may be configured for establishing a communication session between the caller device 102 and the target device 108 associated with a target user. As

mentioned earlier, in some embodiments, the target user may be from a list of target users predefined by the callee. By way of an example, as shown in FIG. 2, the option providing module 220 may provide multiple options to the callers A1 and A2 for establishing a communication session with one or more predefined target users, after their attempt to establish a call connection with callee B fails. For example, the option providing module 220 may provide the caller A1 the option 1 for the friend of the callee B, the option 2 for the colleague of the callee B, the option 3 for the spouse of the callee B, and option 4 for the parent of the callee B. Similarly, the option providing module 220 may provide the caller A2 the option 1 for the friend of the callee B and option 2 for the neighbor of the callee B.

[039] It may be note that, in some embodiments, the plurality of options may be provided via an interactive voice response (IVR). For example, upon detecting the failure in establishing the call connection and the triggering of one or more criteria, the option providing module 220 may trigger a voice conversation with the caller through the caller device 102 to provide the plurality of options.

[040] Further, in some embodiments, the option providing module 220 may provide the plurality of options in an order to the caller. In some embodiments, the order may be predefined by the callee. The option providing module 220 may provide to the caller two or more options for reaching to two or more target users. For example, the first option is for establishing a call with the spouse of the callee, and a second option is for establishing a call with a colleague of the callee. Accordingly, first an attempt is made for establishing a communication session with the spouse of the callee (first option). When this communication session fails to establish, another attempt is made to establish a communication session with the colleague of the callee (second option).

[041] In some embodiments, the list of one or more target users may be generated by the call management system 200. The option generating module 222 may generate a plurality of options configured for establishing a communication session between the caller and a target device associated with one of one or more target users. By way of an example, the option generating module 222 may generate the plurality of options based on a relationship proximity of the target user with the callee, or a spatial proximity of a target user with the callee, or a frequency of communication (e.g., calls) between the target device 108 and the callee device 104,

or an elapsed time period since a last communication between the target device 108 and the callee device 104, and so on.

[042] Further, in some embodiments, the option generating module 222 may provide the plurality of options to the caller in an order. For example, the option generating module 222 may provide a first option for establishing a call with a target user having nearest spatial proximity with the callee (such as a colleague), and a second option for sending a text message to the target user with whom the callee has highest frequency of calls in the past (such as spouse). Accordingly, a first attempt is made for establishing a call connection with the target user corresponding to the option 1. If this call connection fails to establish, another attempt is made to send the text message to the target user corresponding to the option 2.

[043] The communication session establishing module 224 may establish a call connection between the caller device 102 and a callee device 104. However, in case of detection of failure in establishing the call connection and triggering of the one or more criteria, the communication session establishing module 224 may automatically establish a communication session between the caller device 102 and the target device 108. The communication session establishing module 224 may establish the communication session based on the input received from the caller on the plurality of options.

[044] As mentioned earlier, the type of communication session may be predefined by the callee. For example, as shown in FIG. 2, the callee B may predefine that the communication session to be established between the caller A1 and the Friend (option 1) is a call connection type, and the communication session to be established between the caller A1 and the Spouse (option 3) is a text message type. In other words in case of detection of failure in establishing a call connection (between the caller A1 and the callee B) and detection of fulfillment of a predefined criteria, the communication session establishing module 224 may establish a call connection between the caller A1 and the Friend (option 1), or leave a text message to the Spouse (option 3). Further, in some embodiments, the type of communication session may be determined by the call management system 200. By way of an example, the management system 200 may determine a type of communication session between the caller and the target user based on historical data (e.g., a pattern of historical interaction between the caller and the target user). For example, the call management system 200 may determine the type of communication session

between the caller A1 and the Friend (option 1) of the callee to be call connection, based on the historical records of communication session between the caller A1 and the Friend (option 1) of the callee. Similarly, the call management system 200 may determine the type of communication session between the caller A1 and the Spouse (option 3) of the callee to be text message, since in the past, the caller A1 and the Spouse (option 3) have communicated only through text messaging.

[045] It may be noted that the call connection between the caller device 102 and the callee device 104, or the communication session between the caller device 102 and the target device 108 may be established using one or more unique contact information corresponding to the callee device 104 or the target device 108, respectively. The one or more unique contact information may include a subscriber identification module (SIM) number, a public switched telephone network (PSTN) number, and so on.

[046] Referring now to FIG. 3, a flowchart 300 of a method for managing voice calling is illustrated, in accordance with an embodiment. In some embodiments, the voice calling may be managed by a call management system 200. At step 302, a request from a caller device 102 is received for establishing a call connection between the caller device 102 and a callee device 104. In some embodiments, the request from the caller device 102 may be received by a call connection request receiving module 216 of the call management system 200.

[047] At step 304, a failure in establishing the call connection may be detected. At step 304, further, a triggering of one or more criteria may be detected. In some embodiments, failure in establishing the call connection and the triggering of the one or more criteria may be detected by a detection module 218 of the call management system 200. It may be noted that the one or more criteria may be predefined by a callee through the callee device 104. The failure in establishing the call connection may be due to one or more reasons discussed above. The one or more criteria are also discussed above.

[048] At step 306, a plurality of options are provided to the caller in response to the detecting of failure in establishing the call connection and the triggering of the one or more criteria. It may be noted that each of the plurality of options may be configured for establishing a communication session between the caller device 102 and a target device 108 associated with a target user of a list of plurality of target users. It may be noted that the communication session

may include one of a call connection, a text message, and a voice message. In some embodiments, a type of communication session for each of the target users may be predefined by the callee. Alternatively, in some embodiments, the type of communication session for each of the target users may be determined by the call management system. Further, in some embodiments, the list of plurality of target users may be predefined by the callee 104. Alternatively, in some embodiments, the list of plurality of target users may be generated by the call management system 200. By way of an example, the list of one or more target users may be generated based on a relationship proximity of the target user with the callee, or a spatial proximity of a target device 108 with the callee device 104, or a frequency of communication between the target device 108 and the callee device 104, or an elapsed time period since a last communication between the target device 108 and the callee device 104, etc. In some embodiments, the plurality of options may be provided to the caller via an interactive voice response (IVR). Further, in some embodiments, the plurality of options may be provided in an order. It may be noted that the order may be predefined by the callee. Alternately, the order may be generated by the call management system 200.

[049] At step 308, an input is received from the caller on the plurality of options. In some embodiments, the input may be received by the input receiving module 214 of the call management system 200. The input may include selection of an option to establish a communication session between the caller device 102 and the target device 108. By way of an example, the input may include selection of an option for establishing a communication session with a target device 108 associated with a target user having the closest relationship proximity with the callee (for example, the spouse, or a parent or a sibling). By way of another example, the input may include selection of an option for establishing a call connection with a target device 108 having the nearest spatial proximity with the callee device 104 (for example, a target device associated with a neighbor or a colleague of the callee). In some embodiments, the input received may include an ordered selection of a set of options from the plurality of options. Accordingly, the input receiving module 214 may receive two or more inputs from the caller to be followed in the order. In some embodiments, the input received from the caller may be stored for a subsequent use in managing voice calling from the caller device to the callee device upon

detecting the failure in establishing the call connection between the caller device 102 and the callee device 104. The input may be stored in a data repository 212.

[050] At step 310, a communication session is automatically established between the caller device 102 and the target device 108 based on the input. In some embodiments, the communication session is established by a communication session establishing module 224 of the call management system 200. It may be noted that the communication session between the caller device 102 and the target device 108 may be established using one or more unique contact information corresponding to the target device 108.

[051] Referring now to FIG. 4, a flowchart 400 of an exemplary method for managing voice calling is illustrated, in accordance with an embodiment. At step 402, the method for managing voice calling is started. At step 404, a caller device A attempts to establish a call connection between the caller device A and a callee device B. In other words, at step 404, a call request is received by a call management system from the caller device A. At step 406, it is determined whether a call management facility is enabled by the callee device B. If it is determined that the call management facility is not enabled by the callee B, the method 400 proceeds to step 412 and comes to stop. Therefore, the caller device A may keep ringing and eventually come to a stop if the call is not established between the caller device A and the callee device B. However, if at step 406, it is determined that the call management facility is enabled by the callee device B, the method 400 proceeds to step 408.

[052] At step 408, it is determined whether the caller device A is authorized by callee device B to access call management facility based on a predefined criteria. It may be understood that the criteria may be predefined by a callee associated with the callee device B and stored in the data repository. Further, at step 408, the predefined criteria 410 is received from the data repository. Accordingly, at step 408, it is determined whether a caller associated with the caller device A meets the criteria predefined by the callee, and based on that it is determined whether the caller is authorized by callee to access the call management facility. If at step 408, it is determined that the caller is not authorized by the callee to access the call management facility, the method proceeds to step 412, and the method comes to a stop. However, if at step 408, it is determined that the caller is authorized by the callee to access the call management facility, the method proceeds to step 414.

[053] At step 414, it is determined if the number of requests sent by the caller device A for establishing the call are greater than a predefined number (for example, 10). In order to determine this, at step 414, a further criterion 416 is received from the data repository. Thus, at step 414, it is determined if a criteria of minimum number of call requests received from the caller device A meets a criteria of a minimum number of requests. If it is determined that the criteria of minimum number of call requests received from the caller A is not met (i.e. the number of requests sent by the caller A is less than 10), the method proceeds to step 412 (as shown by connector A), and comes to a stop. However, If it is determined that the criteria of minimum number of call requests received from the caller A is met (i.e. the number of requests sent by the caller A is greater than 10), the method proceeds to step 418.

[054] At step 418, a plurality of options are provided to the caller. Each of the plurality of options may be configured for establishing a call connection between the caller device A and a target device C associated with a target user of one or more target users. Further, at step 418, the plurality of options 420 in form of a list of one or more target users may be received from the data repository. The list of one or more target users may be predefined by the callee (i.e., received as input from the callee during initial set-up of the call management facility). Alternatively or additionally, the list of one or more target users may be generated by the call management system.

[055] At step 422, an input from the caller is received on the plurality of options. At step 424, the input received from the caller is stored in the data repository. This stored input may be used in the future without again needing to receive the input from the caller. At step 426, a call request is sent to the target device C to establish a call connection between the caller device A and the target device C. At step 428, it is determined whether the call connection between the caller device A and the target device C is successfully established or not. If it is determined that call connection is successfully established, the method proceeds to step 412, and the method comes to a stop. However, if it is determined that the call connection is not successfully established, the method proceeds to step 430.

[056] At step 430, it is determined if any more options from the plurality of options are available. If it is determined that one or more options are left, then the method proceeds once again to step 426 so as to attempt to establish a predefined communication session between the

caller device A and a target device corresponding to next selected option. However, if, at step 430, it is determined that no more options are available, the method proceeds to step 412, and comes to a stop. Accordingly, no call may be established between the caller A and a target user.

[057] Referring now to FIG. 5, a flowchart 500 of a method for managing voice calling is illustrated, in accordance with another embodiment. At step 502, a request from a caller device 102 is received for establishing a call connection between a caller device 102 associated with a caller and a callee device 104 associated with a callee. At step 504, a failure in establishing the call connection may be detected. Further, at step 504, a triggering of one or more criteria may be detected. As mentioned earlier, the one or more criteria may be predefined by a callee. The reasons for failure in establishing the call connection, and the one or more criteria are as already discussed above.

[058] At step 506, a plurality of options may be provided to the caller. It may be noted that each of the plurality of options may be configured for establishing a communication session between the caller device 102 and a target device 108 associated with a target user from a list of target users. The list of target users may either be predefined by the callee, or generated by the call management system 200. In some embodiments, the plurality of options may be provided via an interactive voice response (IVR). Further, in some embodiments, the plurality of options may be provided in an order. It may be noted that the order may be predefined by the callee, or generated by the call management system 200.

[059] At step 508, an input may be received from the caller on the plurality of options. The input may include selection of an option to establish a communication session between the caller device 102 and a target device 108 of a plurality of target devices. As mentioned earlier, the communication session may include one of a call connection, a text message, and a voice message. In some embodiments, the input received may include an ordered selection of a set of options from the plurality of options.

[060] At step 510, the input received from the caller may be stored in a data repository 212. In some embodiments, the received input may be mapped with the caller form among a plurality of callers. It may be noted that the input may be stored for a subsequent use in the future for managing voice calling from the caller device 102 to the callee device 104 upon detecting the

failure in establishing the call connection between the caller device 102 and the callee device 104.

[061] At step 512, a communication session may be automatically established between the caller device 102 and one of a plurality of target devices 108 based on the stored input for the current call as well as for the future calls by the caller to the callee. The preferences of the caller are determined based on the input received previously from the caller. Accordingly, the communication session is established based on a preferred option of the caller, as specified in the stored input.

[062] As will be appreciated by those skilled in the art, the techniques described in the various embodiments discussed above pertain to managing voice calling. The techniques allow for automatically establishing a communication session between a caller and a target user, if an attempt to establish a call connection between a caller and a callee fails. The target user may be selected from a list of target users who are closely related to or easily accessible to the callee. As a result, possibility of contacting the callee, who may be otherwise unreachable, increases by reaching to the target user. Further, as the list of the target users is provided by the callee or generated automatically, the techniques allow the caller to reach to the target users, even when the caller may not possess the contact information of the target users.

[063] It is intended that the disclosure and examples be considered as exemplary only, with a true scope and spirit of disclosed embodiments being indicated by the following claims.

We Claim:

1. A method for managing voice calling, the method comprising:

receiving, by a call management system, a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee;

detecting, by the call management system, a failure in establishing the call connection and a triggering of one or more criteria, wherein the one or more criteria is predefined by the callee;

in response to detecting, providing, by the call management system, a plurality of options to the caller, wherein each of the plurality of options is configured for establishing a communication session between the caller device and a target device associated with a target user, and wherein the target user is from a list of target users predefined by the callee or generated by the call management system;

receiving, by the call management system, an input from the caller through the caller device on the plurality of options; and

automatically establishing, by the call management system, the communication session between the caller device and the target device based on the input.

2. The method of claim 1, wherein establishing the call connection between the caller device and the callee device or establishing the communication session between the caller device and the target device comprises utilizing one or more unique contact information corresponding to the callee device or the target device respectively.

3. The method of claim 1, wherein the failure in establishing the call connection between the caller device and the callee device comprises one of an inability of the callee to accept a call

connection request, an inability of a communication network to establish the call connection, or an inability of the callee device to receive the call connection request.

4. The method of claim 1, wherein the one or more criteria comprises at least one of an identification of the caller, a number of attempts by the caller device to establish the call connection, an elapsed time period between a first attempt by the caller device to establish the call connection and a current attempt.

5. The method of claim 1, wherein providing the plurality of options comprises providing the plurality of options via an interactive voice response (IVR).

6. The method of claim 1, wherein providing the plurality of options comprises providing the plurality of options in an order, and wherein the order is predefined by the callee or generated by the call management system.

7. The method of claim 1, further comprising generating, by the call management system, a list of plurality of target users based on at least one of:

a spatial proximity of each of a plurality of target devices, associated with a plurality of target users, with the callee device,

a relationship proximity of each of the plurality of target users with the callee,

a frequency of communication between each of the plurality of target devices and the callee device, or

an elapsed time period since a last communication between each of the plurality of target devices and the callee device.

8. The method of claim 1, wherein receiving the input on the plurality of options comprises an ordered selection of a set of options from the plurality of options.

9. The method of claim 1, further comprising storing, by the call management system, the input from the caller for a subsequent use in managing voice calling from the caller device to the callee device upon detecting the failure in establishing the call connection between the caller device and the callee device.

10. The method of claim 1, wherein the communication session comprises one of a call connection, a text message, and a voice message, wherein a type of communication session is predefined by the callee or determined by the call management system.

11. A call management system for managing voice calling, the call management system comprising:

a processor; and

a memory communicatively coupled to the processor, wherein the memory stores processor instructions, which, on execution, causes the processor to:

receive a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee;

detect a failure in establishing the call connection and a triggering of one or more criteria, wherein the one or more criteria is predefined by the callee;

in response to detecting, provide a plurality of options to the caller, wherein each of the plurality of options is configured for establishing a communication session between the caller device and a target device associated with a target user, and wherein the target user is from a list of target users predefined by the callee or generated by the call management system;

receive an input from the caller through the caller device on the plurality of options; and

automatically establish the communication session between the caller device and the target device based on the input.

12. The call management system of claim 11, wherein establishing the call connection between the caller device and the callee device or establishing the communication session between the caller device and the target device comprises utilizing one or more unique contact information corresponding to the callee device or the target device respectively.

13. The call management system of claim 11, wherein the failure in establishing the call connection between the caller device and the callee device comprises one of an inability of the callee to accept a call connection request, an inability of a communication network to establish the call connection, or an inability of the callee device to receive the call connection request.

14. The call management system of claim 11, wherein the one or more criteria comprises at least one of an identification of the caller, a number of attempts by the caller device to establish the call connection, an elapsed time period between a first attempt by the caller device to establish the call connection and a current attempt.

15. The call management system of claim 11, wherein providing the plurality of options comprises providing the plurality of options via an interactive voice response (IVR).

16. The call management system of claim 11, wherein providing the plurality of options comprises providing the plurality of options in an order, and wherein the order is predefined by the callee or generated by the call management system.

17. The call management system of claim 11, wherein the processor instructions further cause the processor to generate a list of plurality of target users based on at least one of:

a spatial proximity of each of a plurality of target devices, associated with a plurality of target users, with the callee device,

a relationship proximity of each of the plurality of target users with the callee,

a frequency of communication between each of the plurality of target devices and the callee device, or

an elapsed time period since a last communication between each of the plurality of target devices and the callee device.

18. The call management system of claim 11, wherein receiving the input on the plurality of options comprises an ordered selection of a set of options from the plurality of options.

19. The call management system of claim 11, further comprising storing, by the call management system, the input from the caller for a subsequent use in managing voice calling from the caller device to the callee device upon detecting the failure in establishing the call connection between the caller device and the callee device.

20. A non-transitory computer-readable storage medium having stored thereon, a set of computer-executable instructions causing a computer comprising one or more processors to perform steps comprising:

receiving a request from a caller device associated with a caller for establishing a call connection between the caller device and a callee device associated with a callee;

detecting a failure in establishing the call connection and a triggering of one or more criteria, wherein the one or more criteria is predefined by the callee;

in response to detecting, providing a plurality of options to the caller, wherein each of the plurality of options is configured for establishing a communication session between the caller device and a target device associated with a target user, and wherein the target user is from a list of target users predefined by the callee or generated by the call management system;

receiving an input from the caller through the caller device on the plurality of options;
and

automatically establishing the communication session between the caller device and the target device based on the input.

1/5

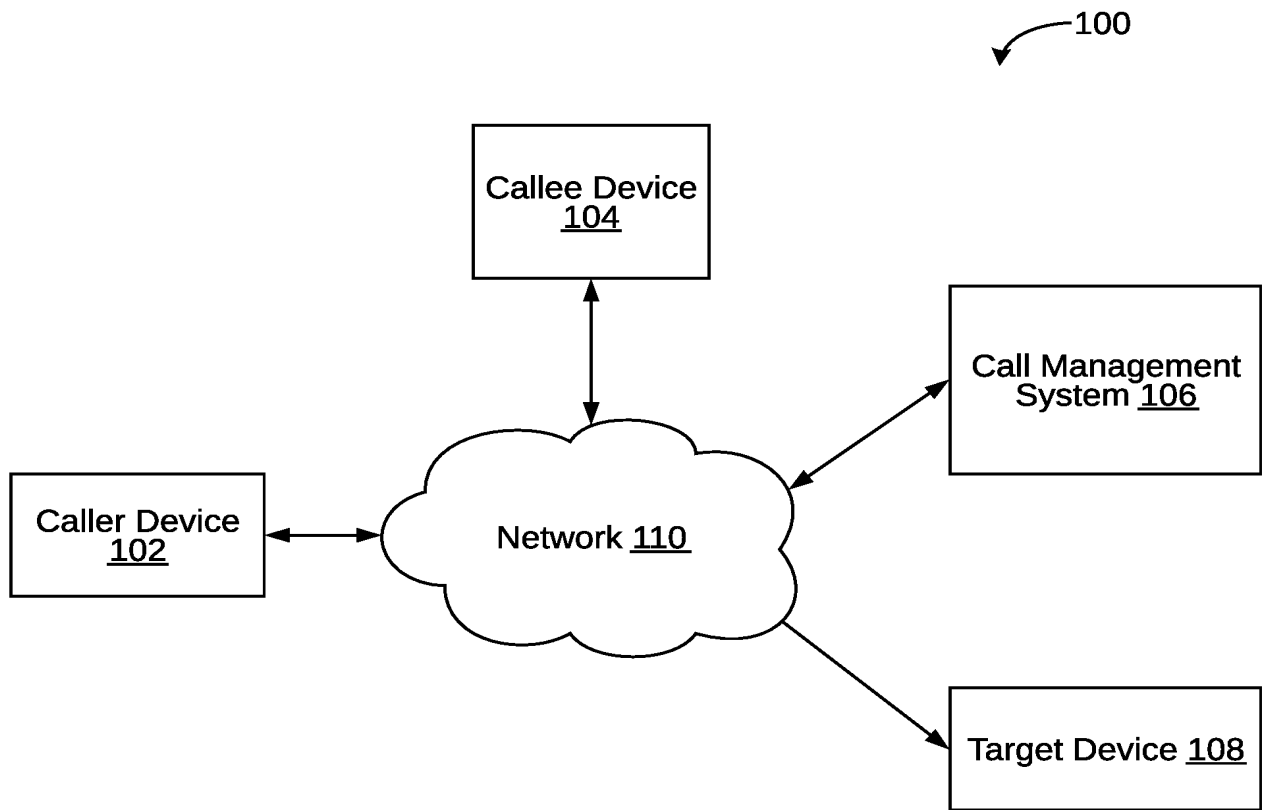


FIG. 1

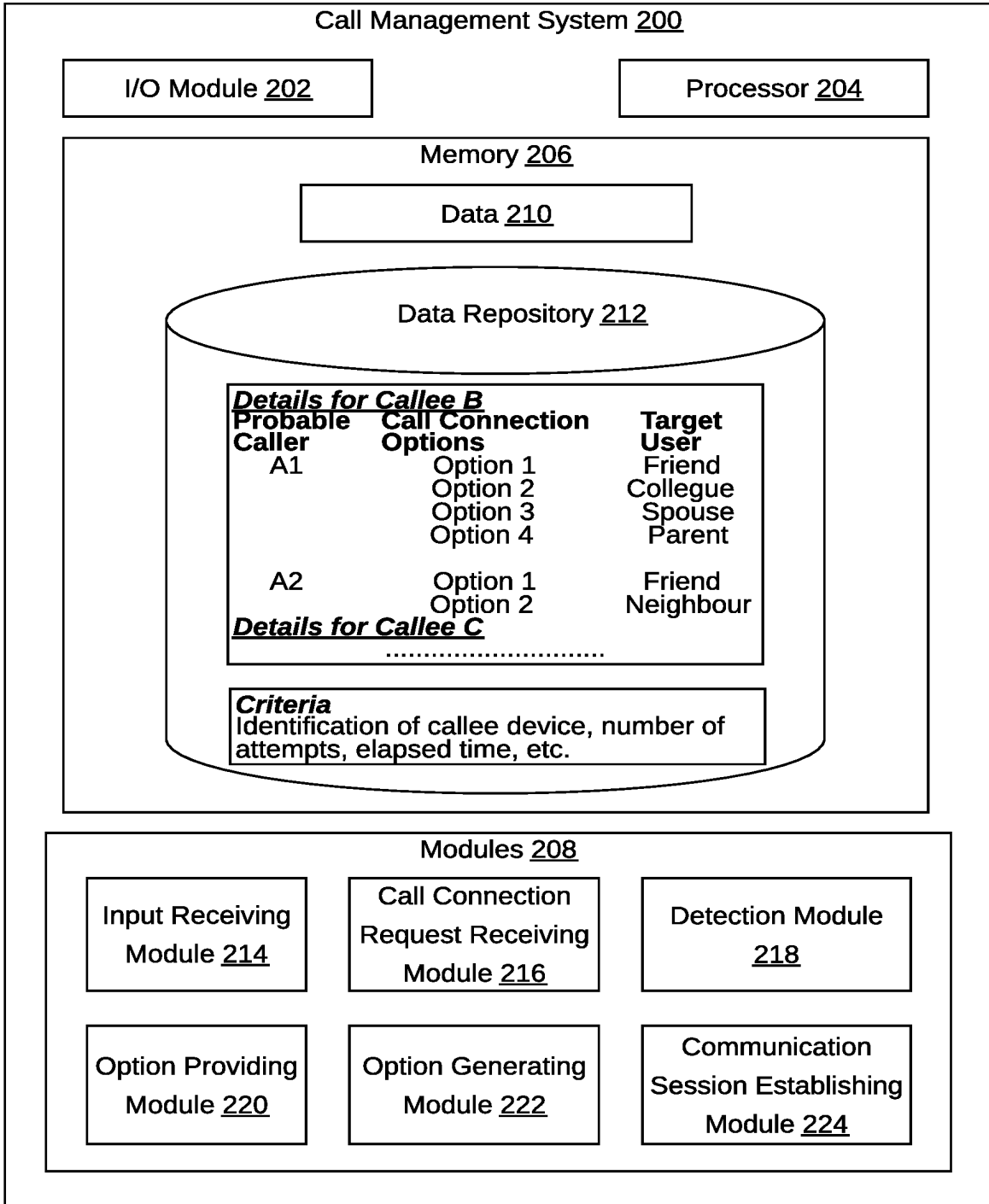


FIG. 2

3/5

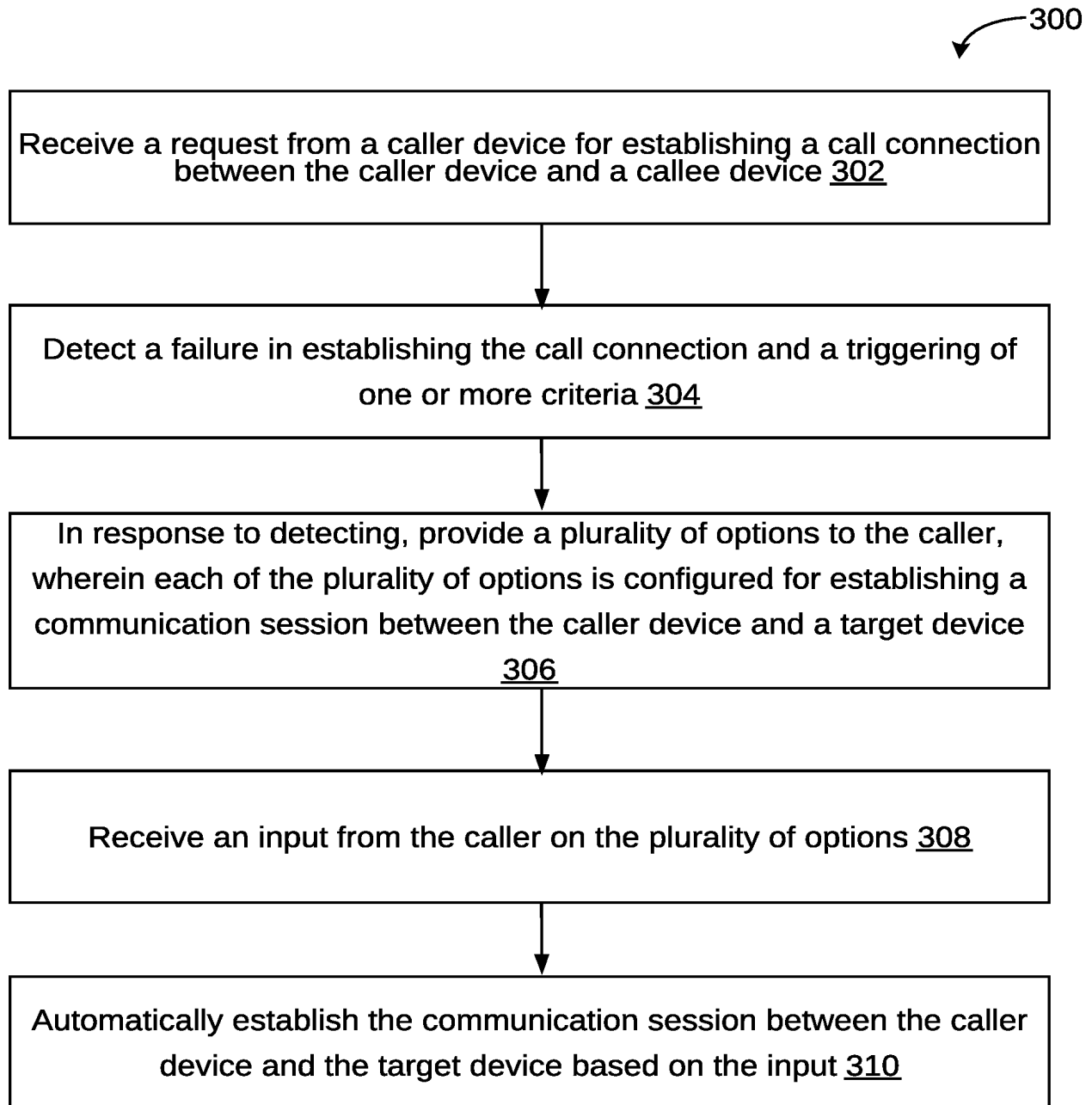


FIG. 3

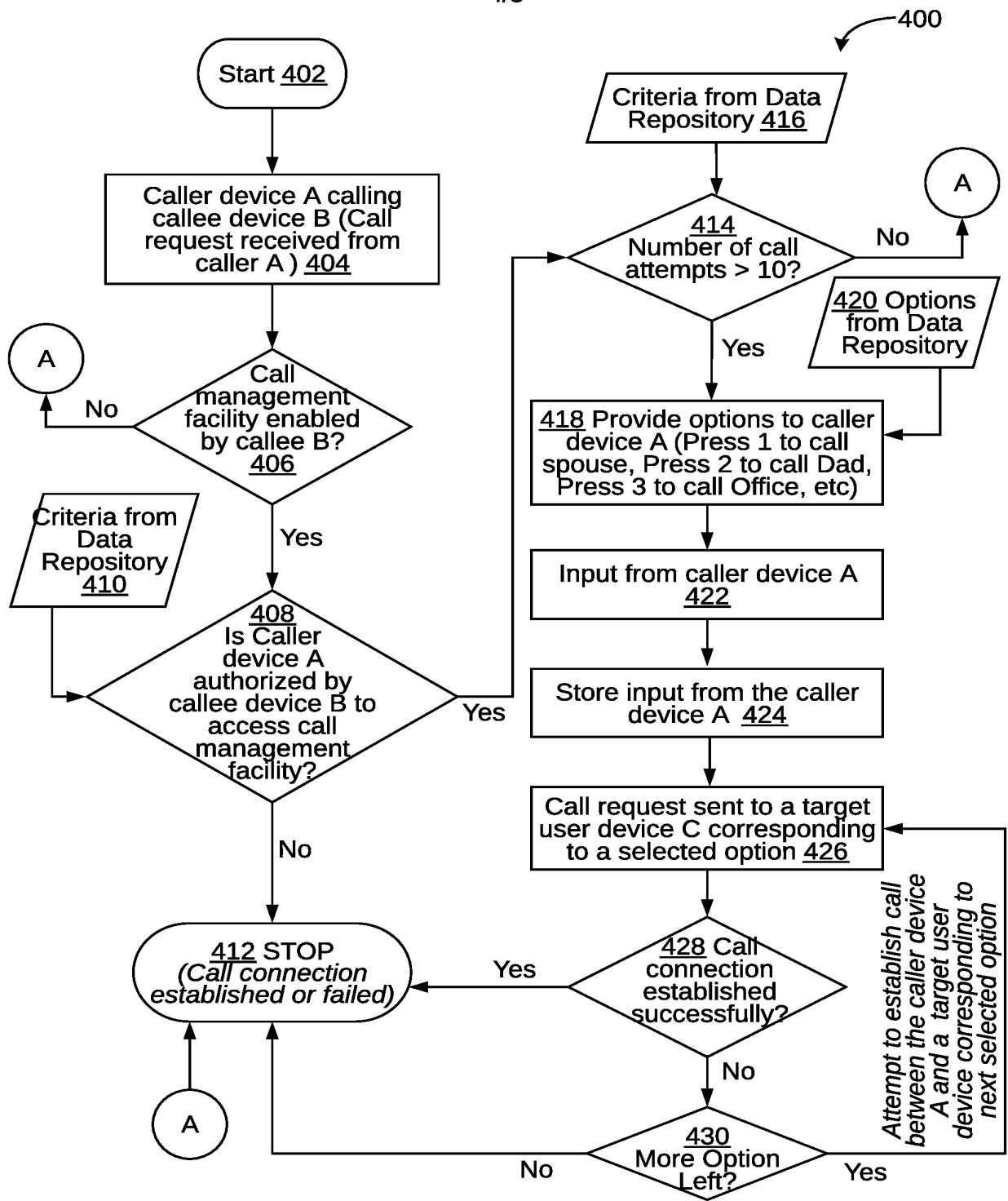


FIG. 4

5/5

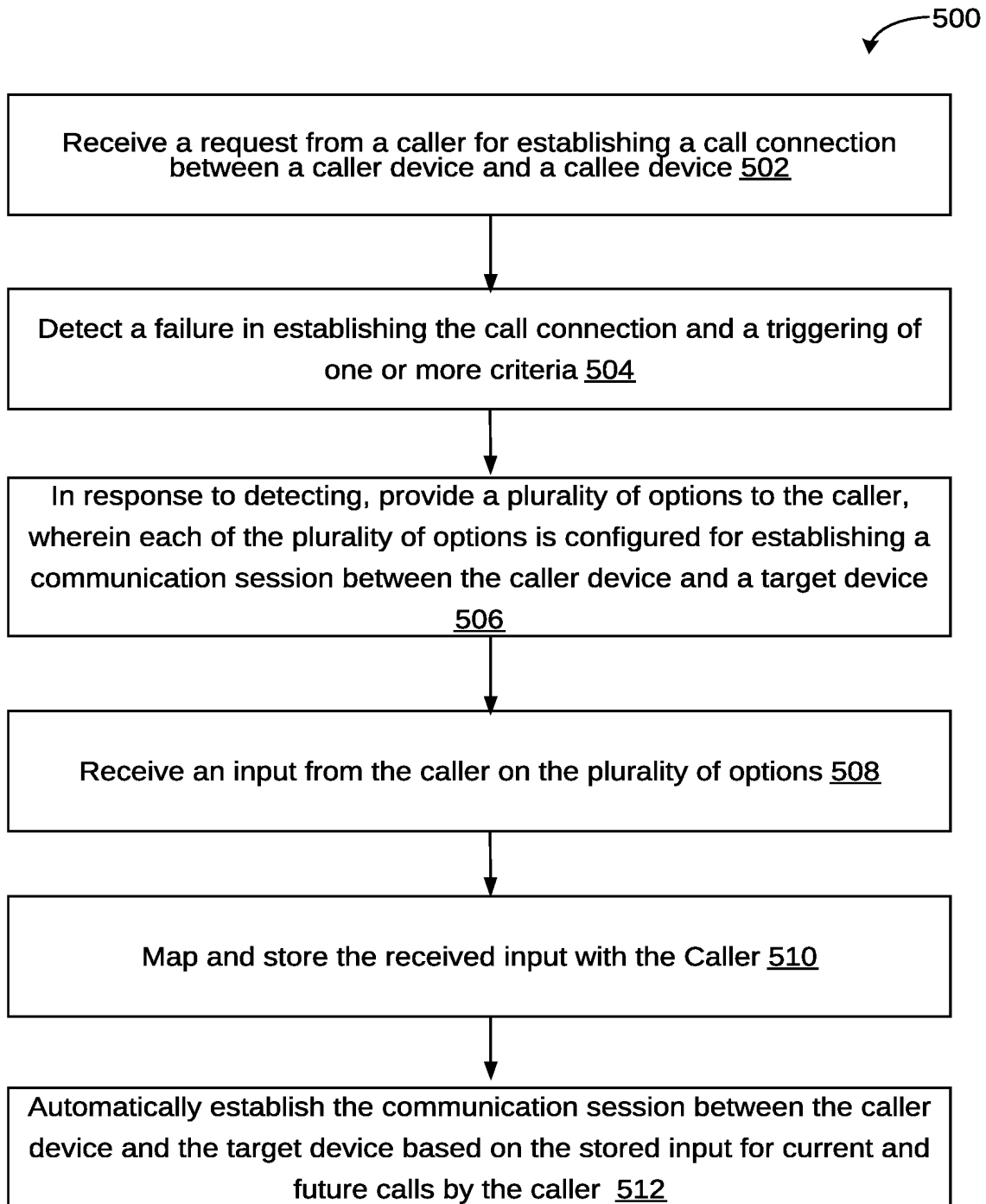


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2018/057482

A. CLASSIFICATION OF SUBJECT MATTER
H04M11/00, H04W76/10 Version=2018.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04M, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases- TotalPatent One, IPO Internal Database
Keywords- Call management, Failure, Interactive, IVR

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8036362 B1 (RNK INC), 11 October 2011 (11.10.2011) Abstract, Description (Columns 2, 4, 5, 11, 12), Claim 1, Figures 1-3.	1-6, 11-16, 20
Y	Description (Columns 4-6)	7-10, 17-19
Y	US 20140287732 A1 (HEWLETT-PACKARD DEVELOPMENT CO LP), 25 September 2014 (25.09.2014) Abstract, Description (Columns 8-10), Claim 1, Figure 1.	7-10, 17-19

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 27-12-2018	Date of mailing of the international search report 27-12-2018
---	--

Name and mailing address of the ISA/ Indian Patent Office Plot No.32, Sector 14, Dwarka, New Delhi-110075 Facsimile No.	Authorized officer Ranjan biswas Telephone No. +91-1125300200
--	---

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2018/057482

Citation	Pub.Date	Family	Pub.Date
US 20140287732 A1	25-09-2014	WO 2013062703 A1	02-05-2013
		US 9172813 B2	27-10-2015
		IN 3708CHE2011 A	21-06-2013