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Han

(54) **GROUP-BASED SOCIAL INTERACTION USING LOCATION-AWARE MOBILE DEVICES**

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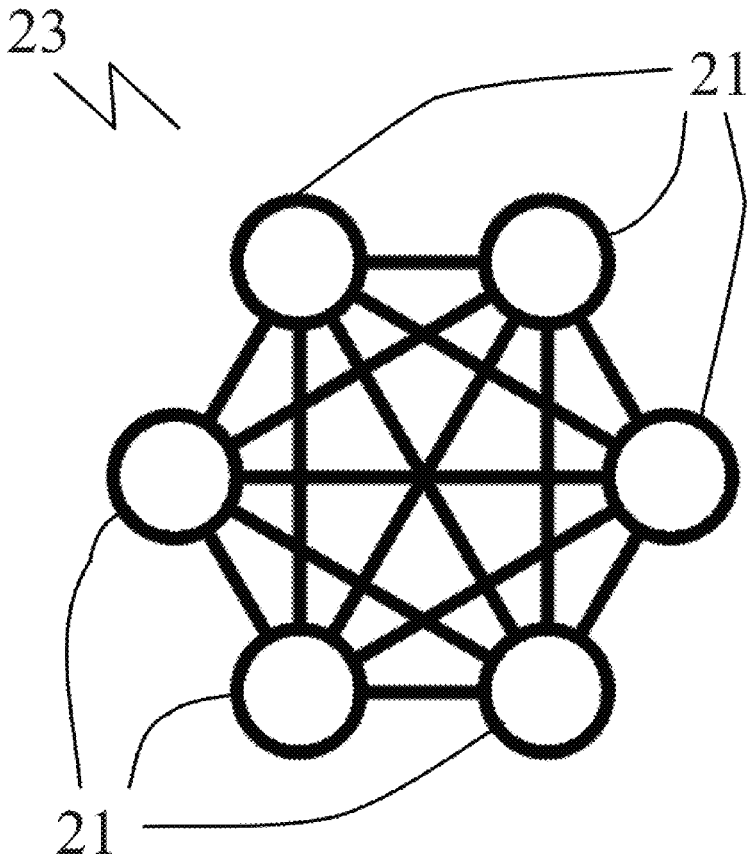
USPC **455/456.3**; 455/519

(57) **ABSTRACT**

A method of social interaction has the steps of providing a network having a set of mobile devices associated with individuals; identifying a plurality of units of at least one subset of the set of mobile devices, at least one unit of the plurality of units comprising a group of mobile devices formed based on common social connections between individuals; characterizing the units by one or more characteristics; ranking a compatibility of units by comparing the one or more characteristics; causing at least one invitation or message to be transmitted over the network from a sending unit to a receiving unit; and sharing contact information of the units once an invitation has been accepted.



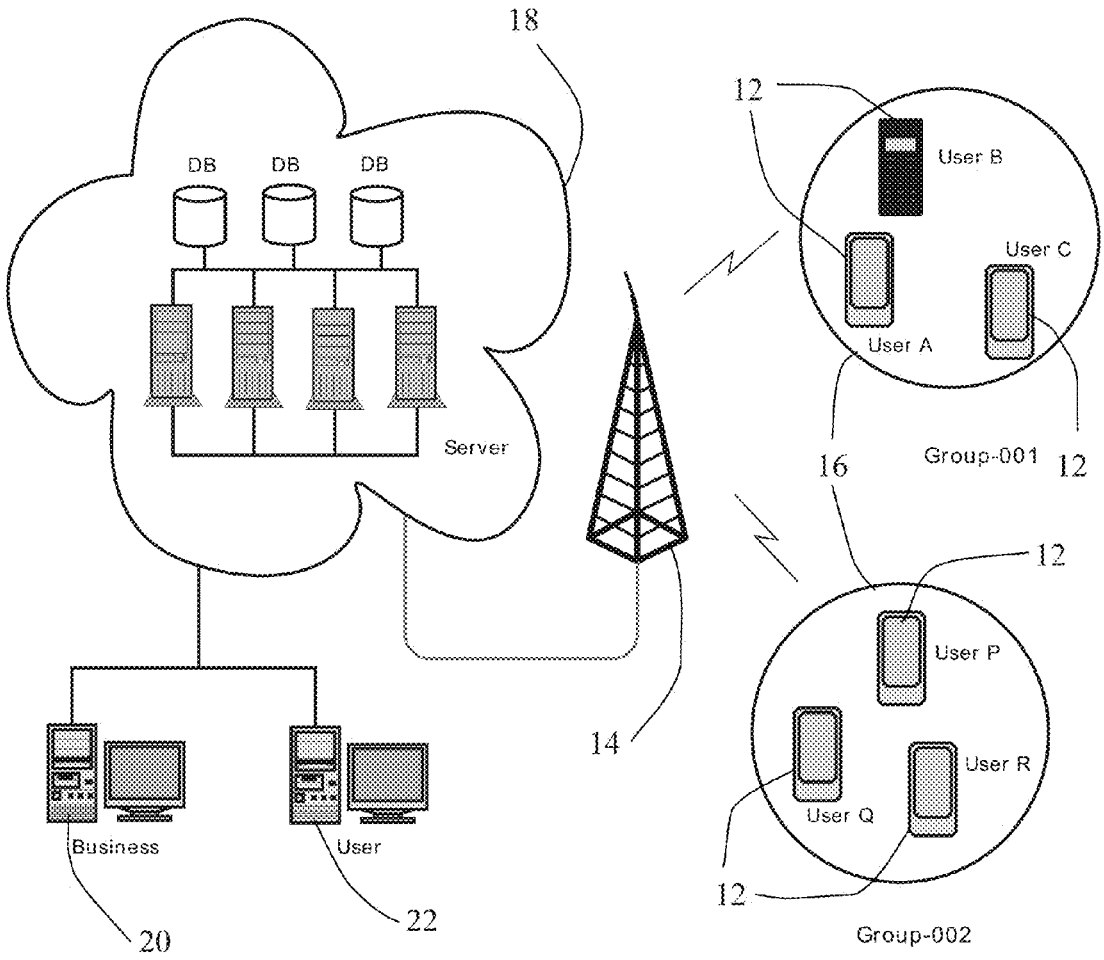

18
12
DB
DB
DB
User B
User C
User A
Server
16
Group-001
12
12
User P
User R
User Q
14
Business
User
12
20
22
Group-002

Figure 1

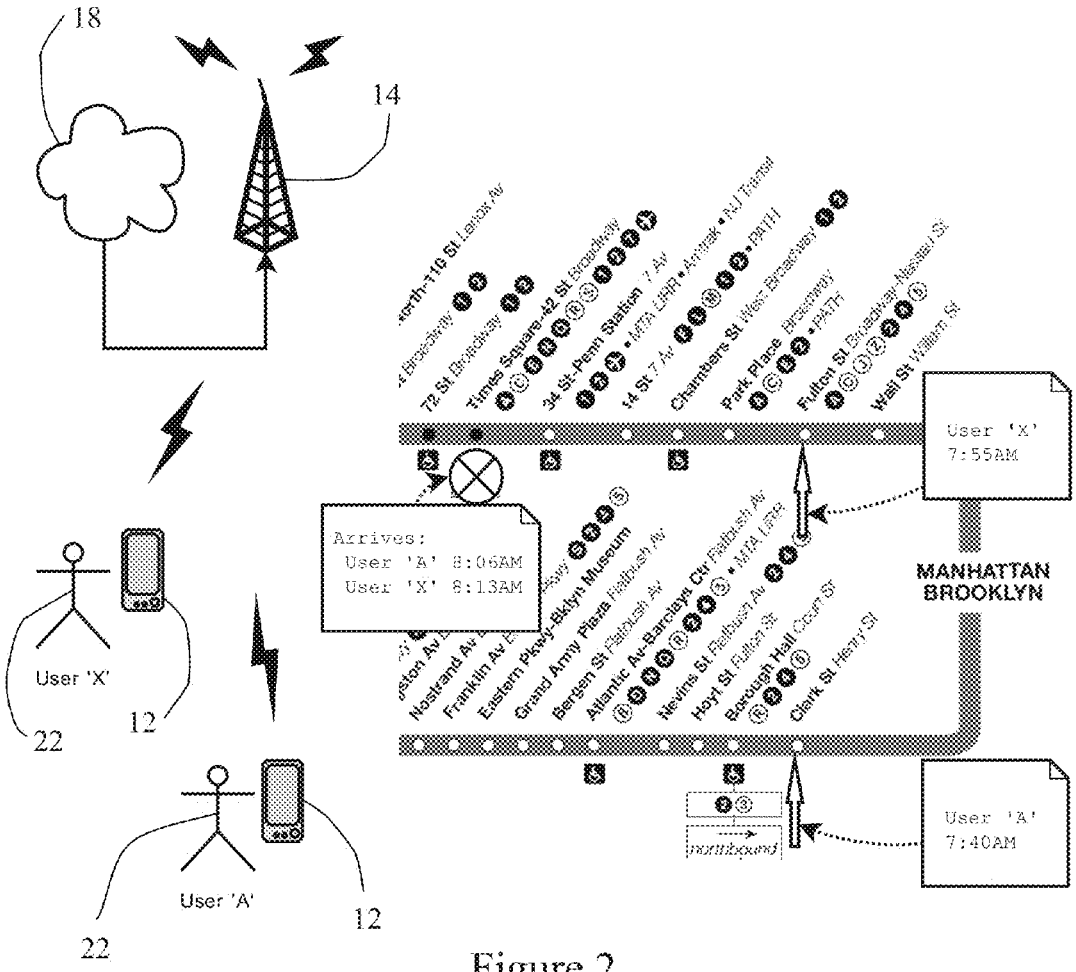

18
14
User 'X'
22
12
User 'A'
22
12
Arrives:
User 'A' 8:06AM
User 'X' 8:13AM
User 'X'
7:55AM
MANHATTAN
BROOKLYN
User 'A'
7:40AM
northbound

Figure 2

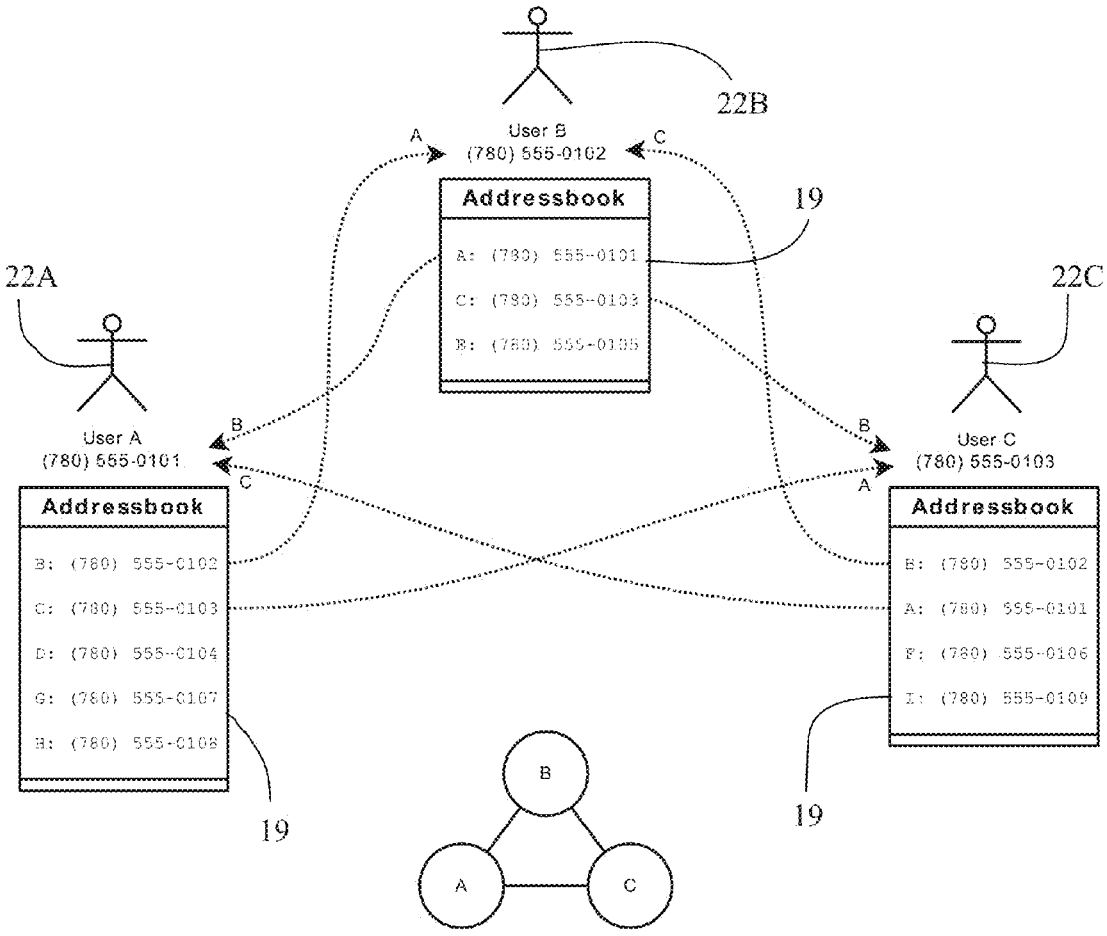

22B
User B
(780) 555-0102
A
C
Addressbook
A: (780) 555-0101
C: (780) 555-0103
B: (780) 555-0105
19
22A
22C
User A
(780) 555-0101
User C
(780) 555-0103
B
C
A
Addressbook
B: (780) 555-0102
C: (780) 555-0103
D: (780) 555-0104
G: (780) 555-0107
B: (780) 555-0108
Addressbook
B: (780) 555-0102
A: (780) 555-0101
F: (780) 555-0106
I: (780) 555-0109
19
19
B
A
C

Figure 3

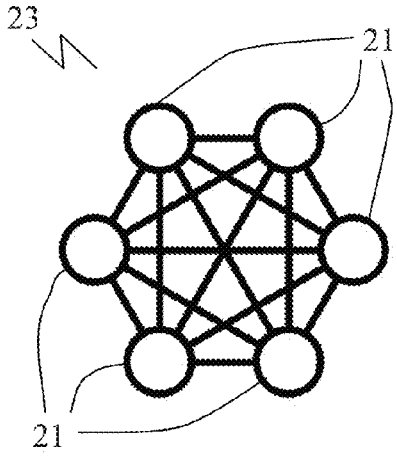


Figure 4

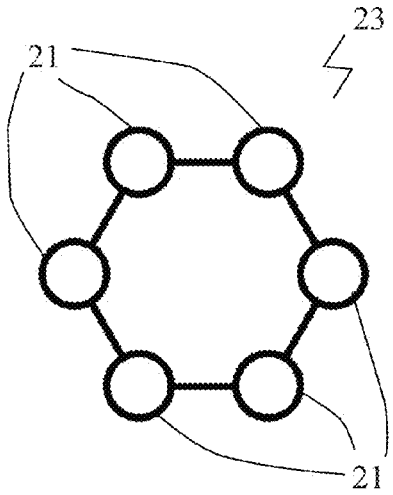


Figure 5

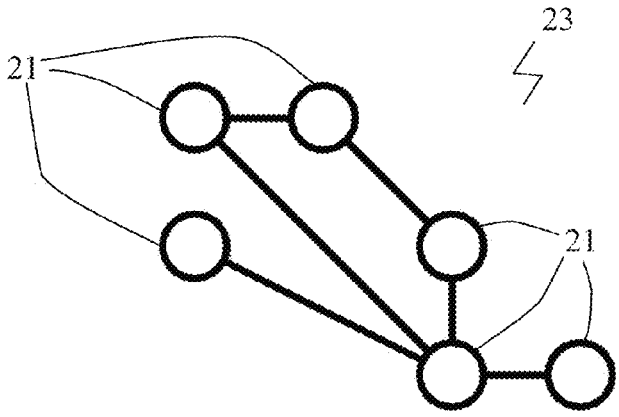


Figure 6

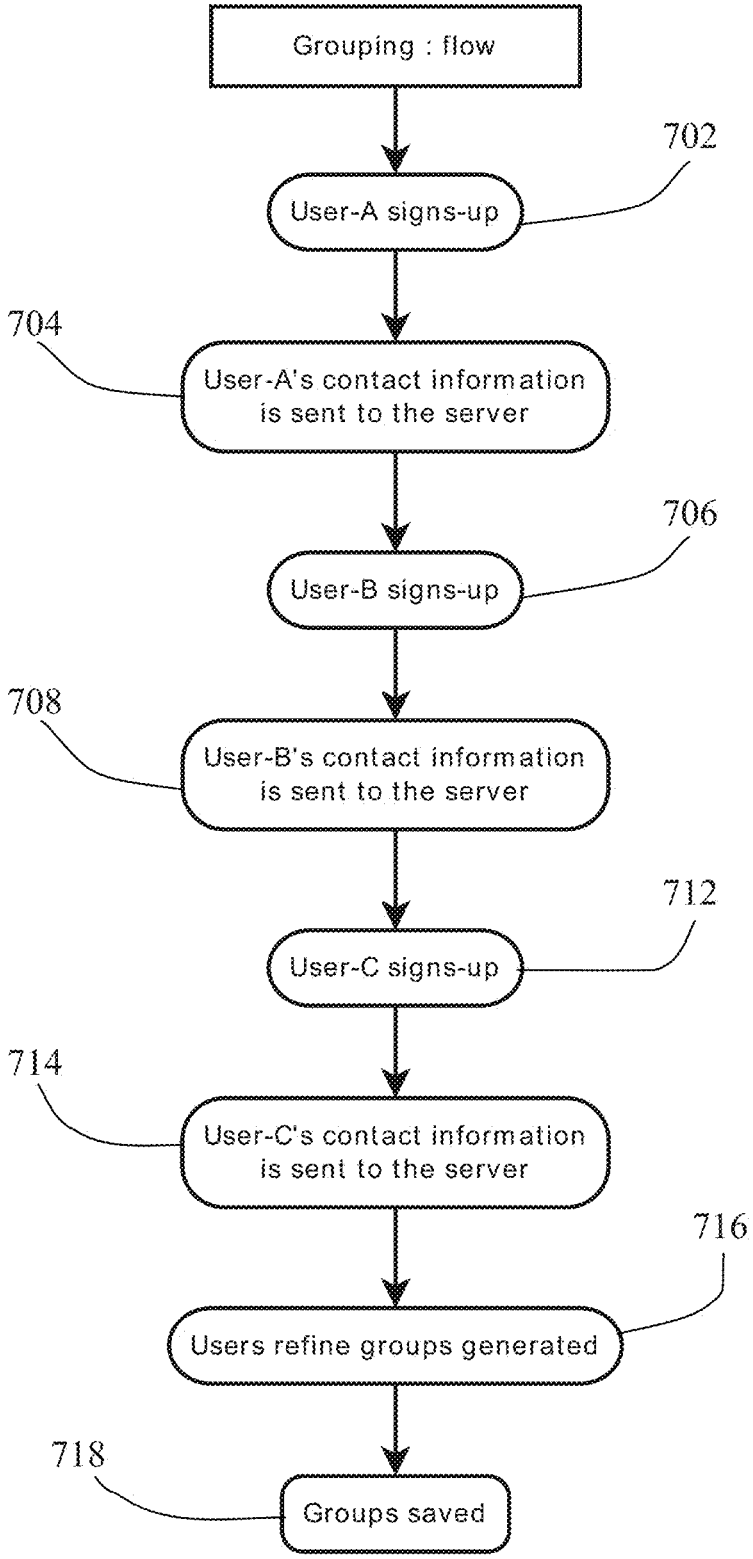

Grouping : flow
702
User-A signs-up
704
User-A's contact information is sent to the server
706
User-B signs-up
708
User-B's contact information is sent to the server
712
User-C signs-up
714
User-C's contact information is sent to the server
716
Users refine groups generated
718
Groups saved

Figure 7

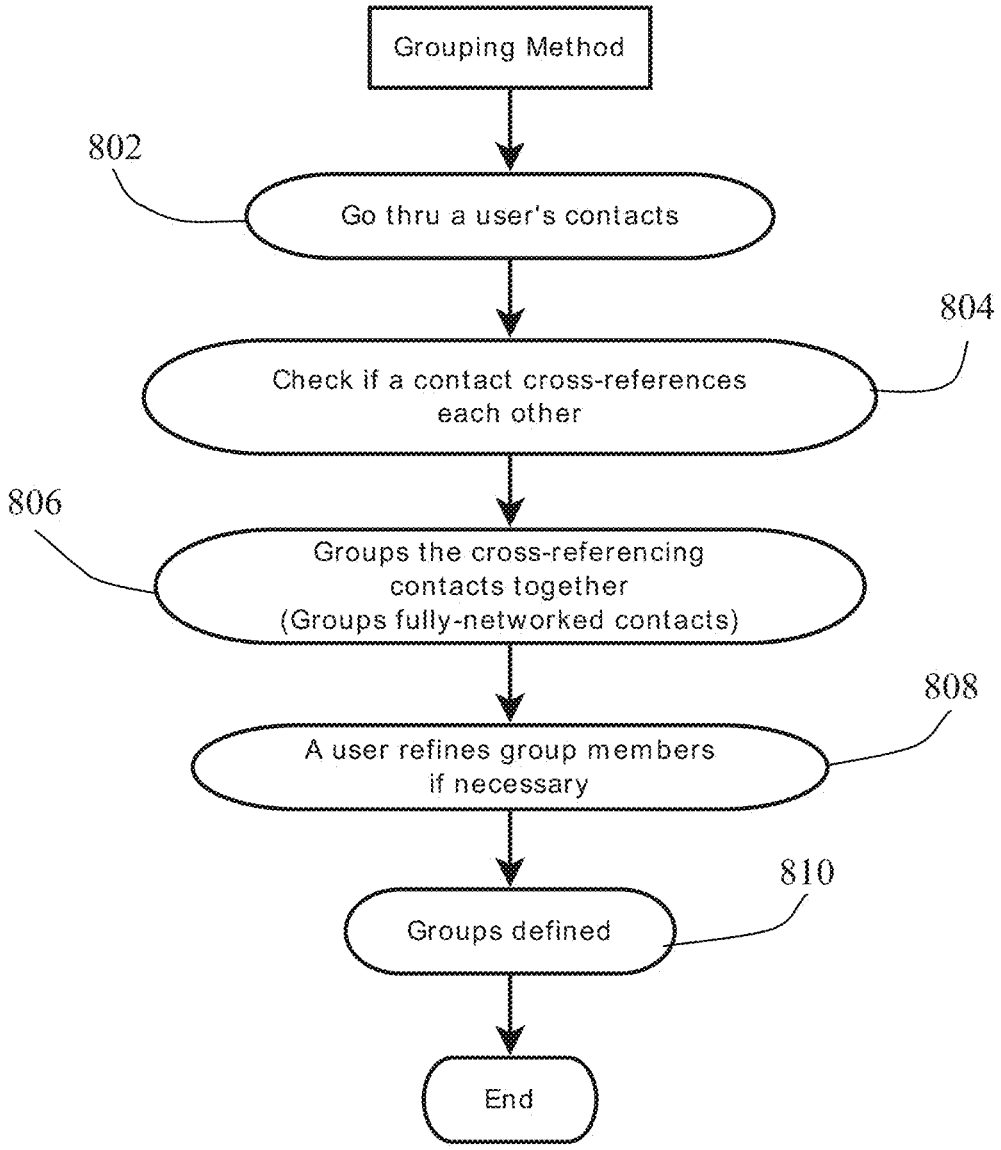

Grouping Method
802
Go thru a user's contacts
804
Check if a contact cross-references each other
806
Groups the cross-referencing contacts together (Groups fully-networked contacts)
808
A user refines group members if necessary
810
Groups defined
End

Figure 8

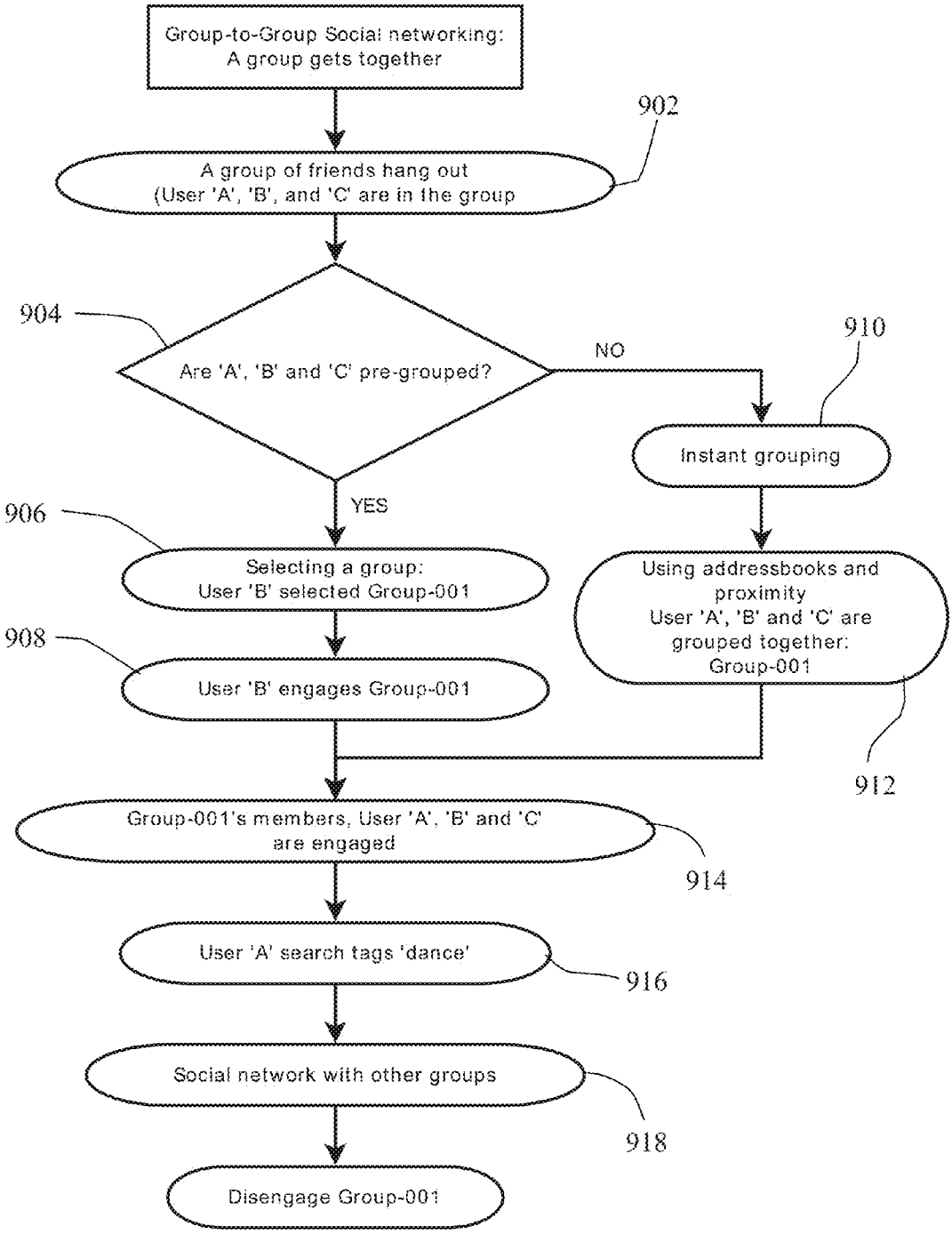

Group-to-Group Social networking:
A group gets together
902
A group of friends hang out
(User 'A', 'B', and 'C' are in the group
904
Are 'A', 'B' and 'C' pre-grouped?
NO
910
Instant grouping
YES
906
Selecting a group:
User 'B' selected Group-001
908
User 'B' engages Group-001
Using addressbooks and
proximity
User 'A', 'B' and 'C' are
grouped together:
Group-001
912
Group-001's members, User 'A', 'B' and 'C'
are engaged
914
User 'A' search tags 'dance'
916
Social network with other groups
918
Disengage Group-001

Figure 9

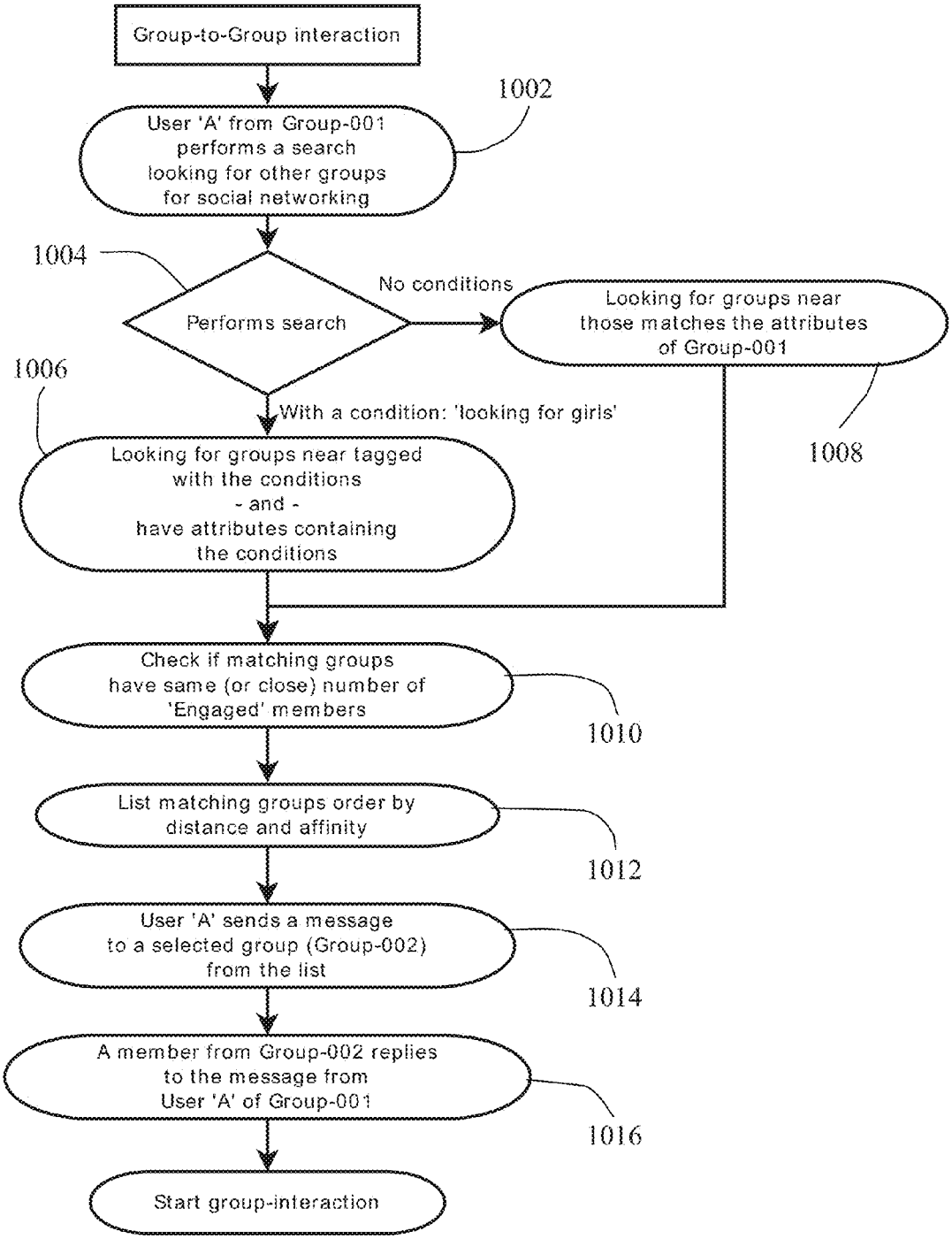

Group-to-Group interaction
1002
User 'A' from Group-001 performs a search looking for other groups for social networking
1004
Performs search
No conditions
Looking for groups near those matches the attributes of Group-001
1008
1006
With a condition: 'looking for girls'
Looking for groups near tagged with the conditions - and - have attributes containing the conditions
Check if matching groups have same (or close) number of 'Engaged' members
1010
List matching groups order by distance and affinity
1012
User 'A' sends a message to a selected group (Group-002) from the list
1014
A member from Group-002 replies to the message from User 'A' of Group-001
1016
Start group-interaction

Figure 10

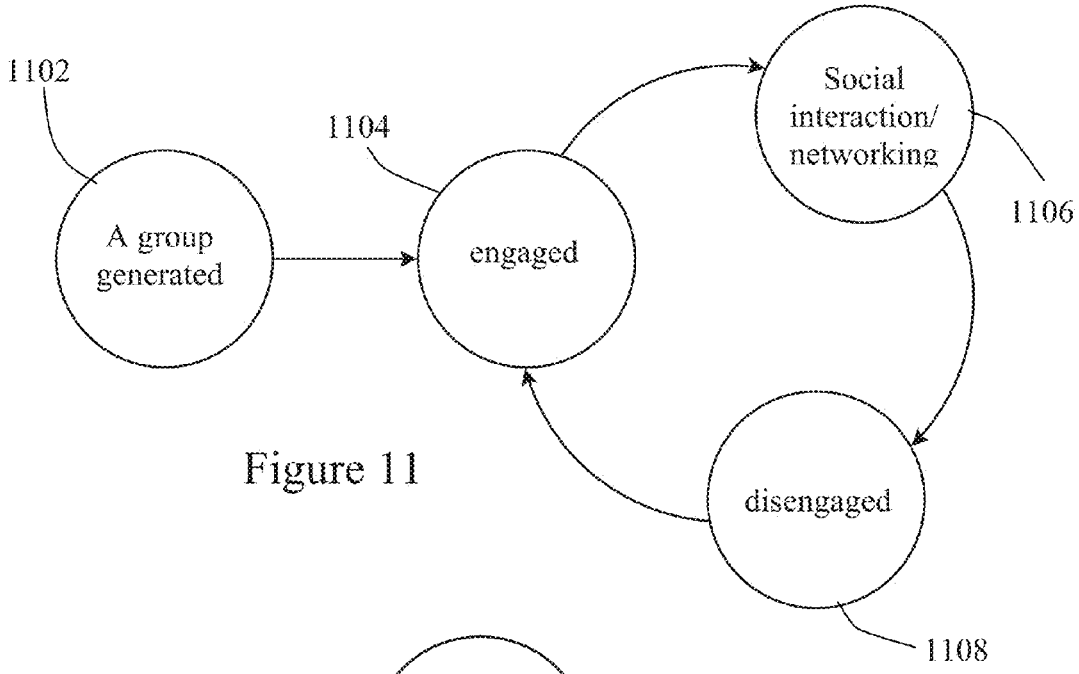


Figure 11

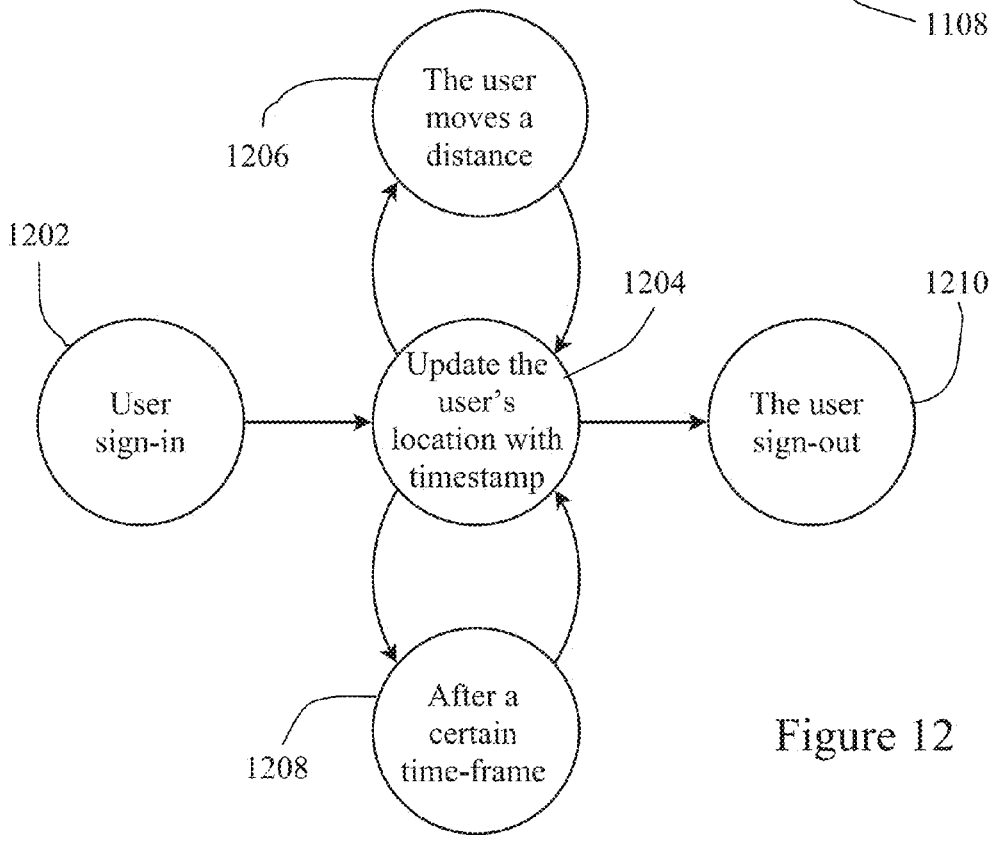


Figure 12

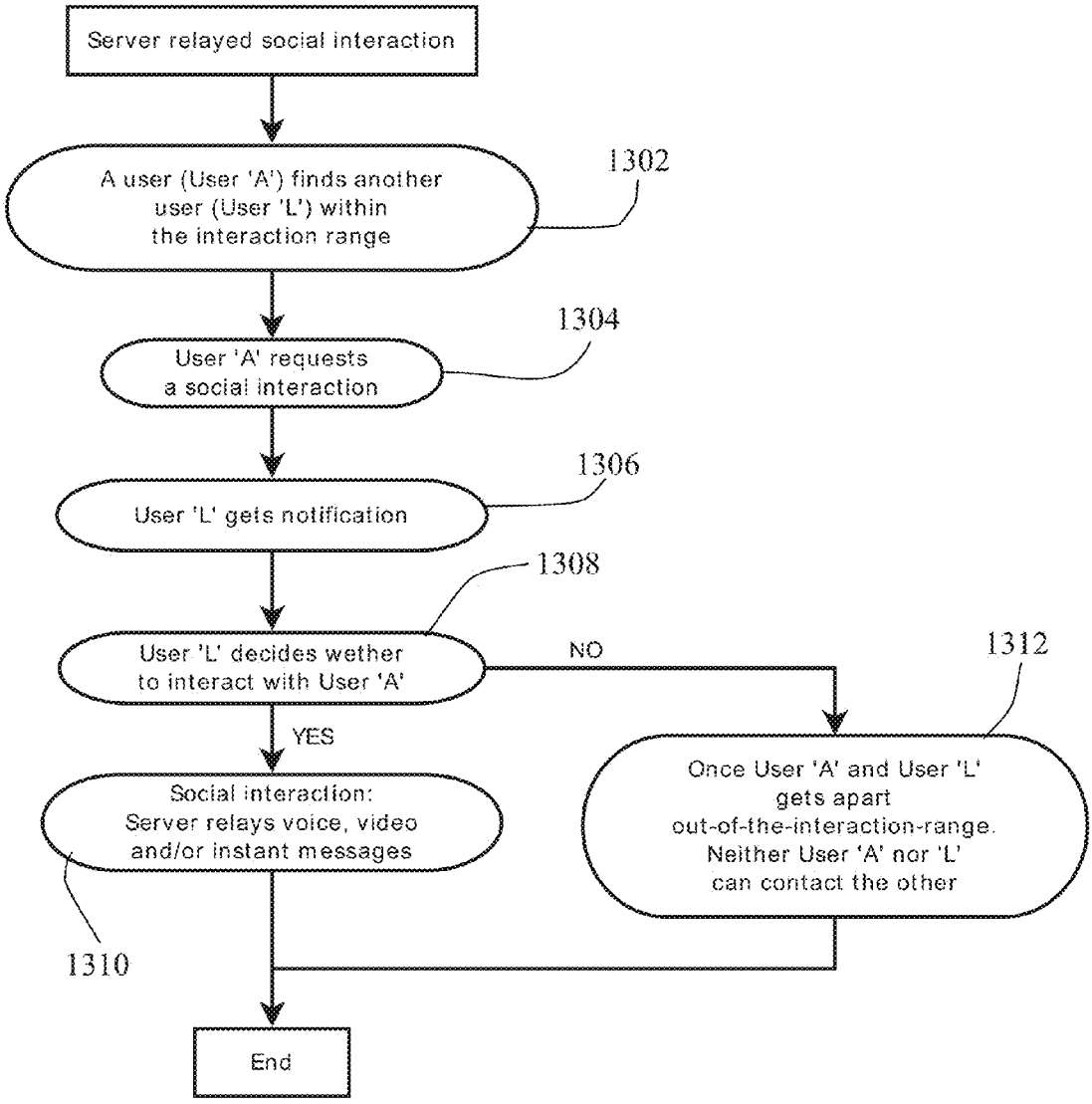

Server relayed social interaction
A user (User 'A') finds another user (User 'L') within the interaction range
1302
User 'A' requests a social interaction
1304
User 'L' gets notification
1306
User 'L' decides wether to interact with User 'A'
1308
NO
1312
YES
Social interaction: Server relays voice, video and/or instant messages
Once User 'A' and User 'L' gets apart out-of-the-interaction-range. Neither User 'A' nor 'L' can contact the other
1310
End

Figure 13

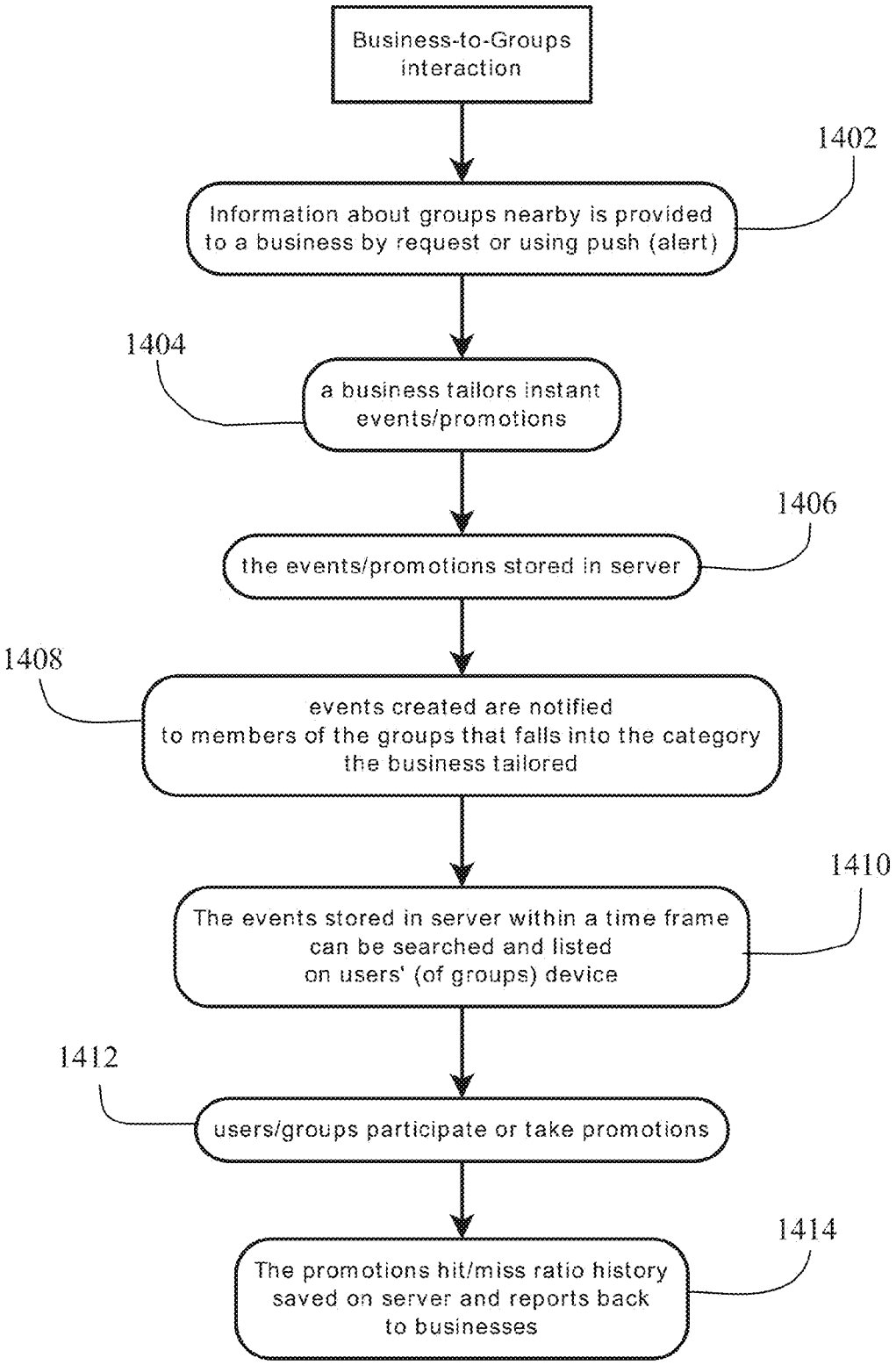

Business-to-Groups interaction
1402
Information about groups nearby is provided to a business by request or using push (alert)
1404
a business tailors instant events/promotions
1406
the events/promotions stored in server
1408
events created are notified to members of the groups that falls into the category the business tailored
1410
The events stored in server within a time frame can be searched and listed on users' (of groups) device
1412
users/groups participate or take promotions
1414
The promotions hit/miss ratio history saved on server and reports back to businesses

Figure 14

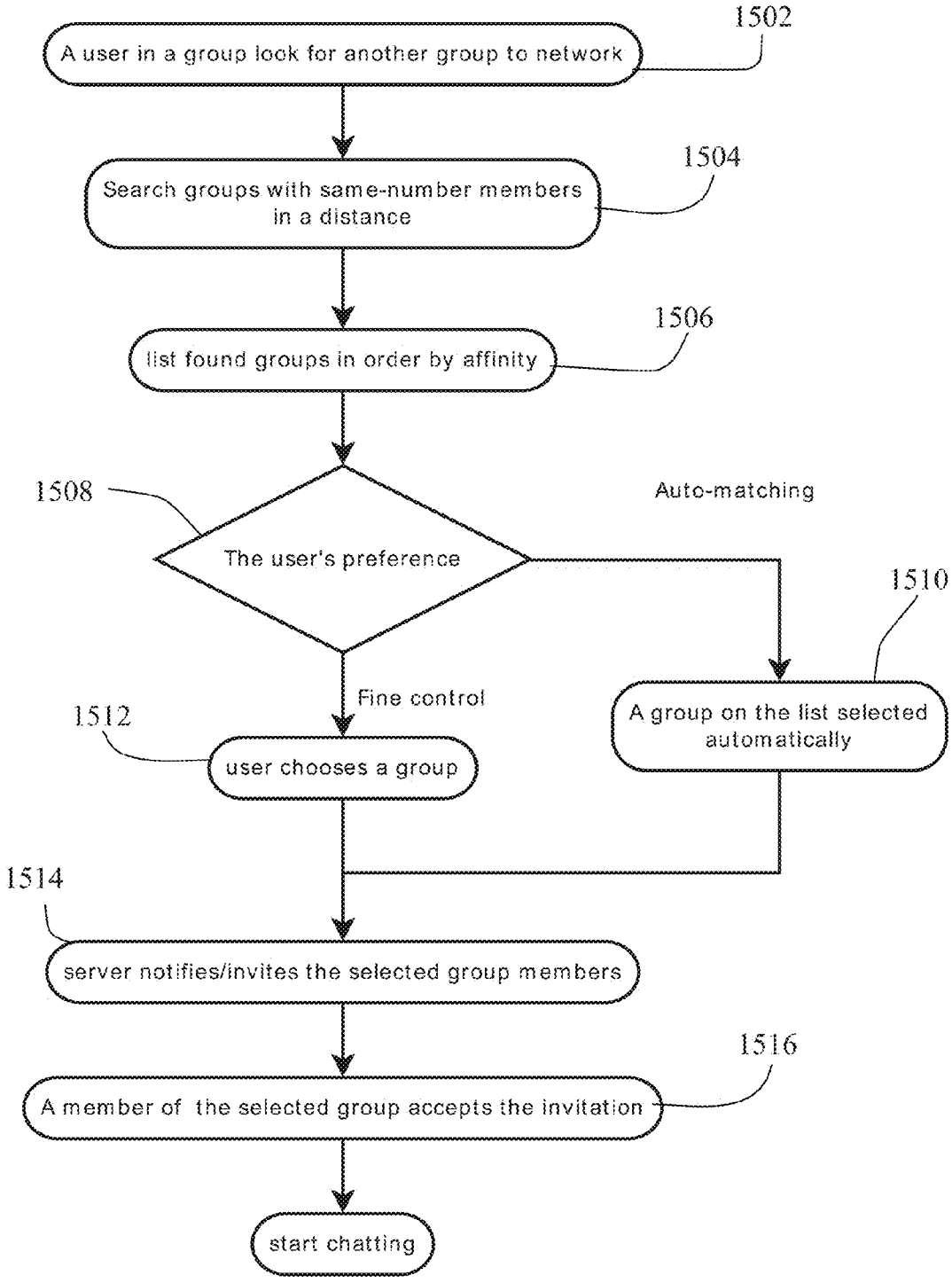

1502
A user in a group look for another group to network
1504
Search groups with same-number members in a distance
1506
list found groups in order by affinity
1508
The user's preference
Auto-matching
1510
A group on the list selected automatically
Fine control
1512
user chooses a group
1514
server notifies/invites the selected group members
1516
A member of the selected group accepts the invitation
start chatting

Figure 15

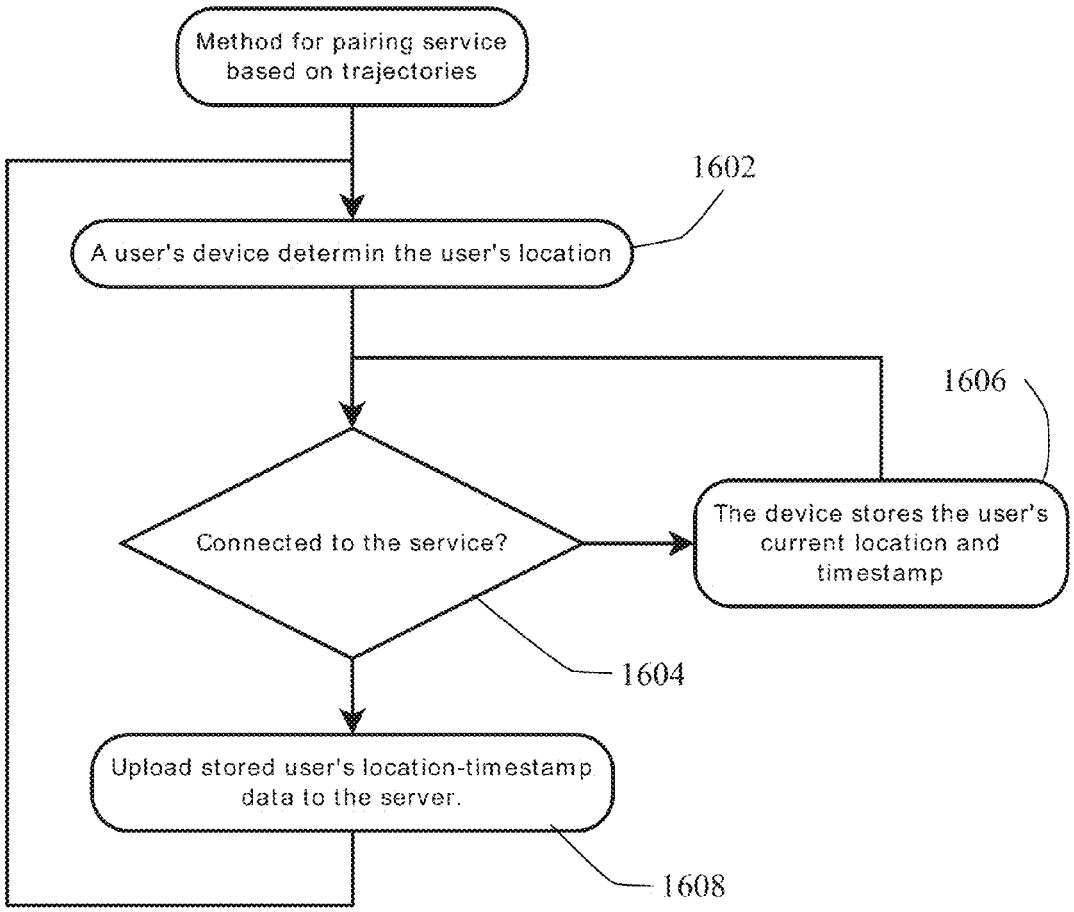

Method for pairing service based on trajectories
1602
A user's device determin the user's location
1606
Connected to the service?
The device stores the user's current location and timestamp
1604
Upload stored user's location-timestamp data to the server.
1608

Figure 16

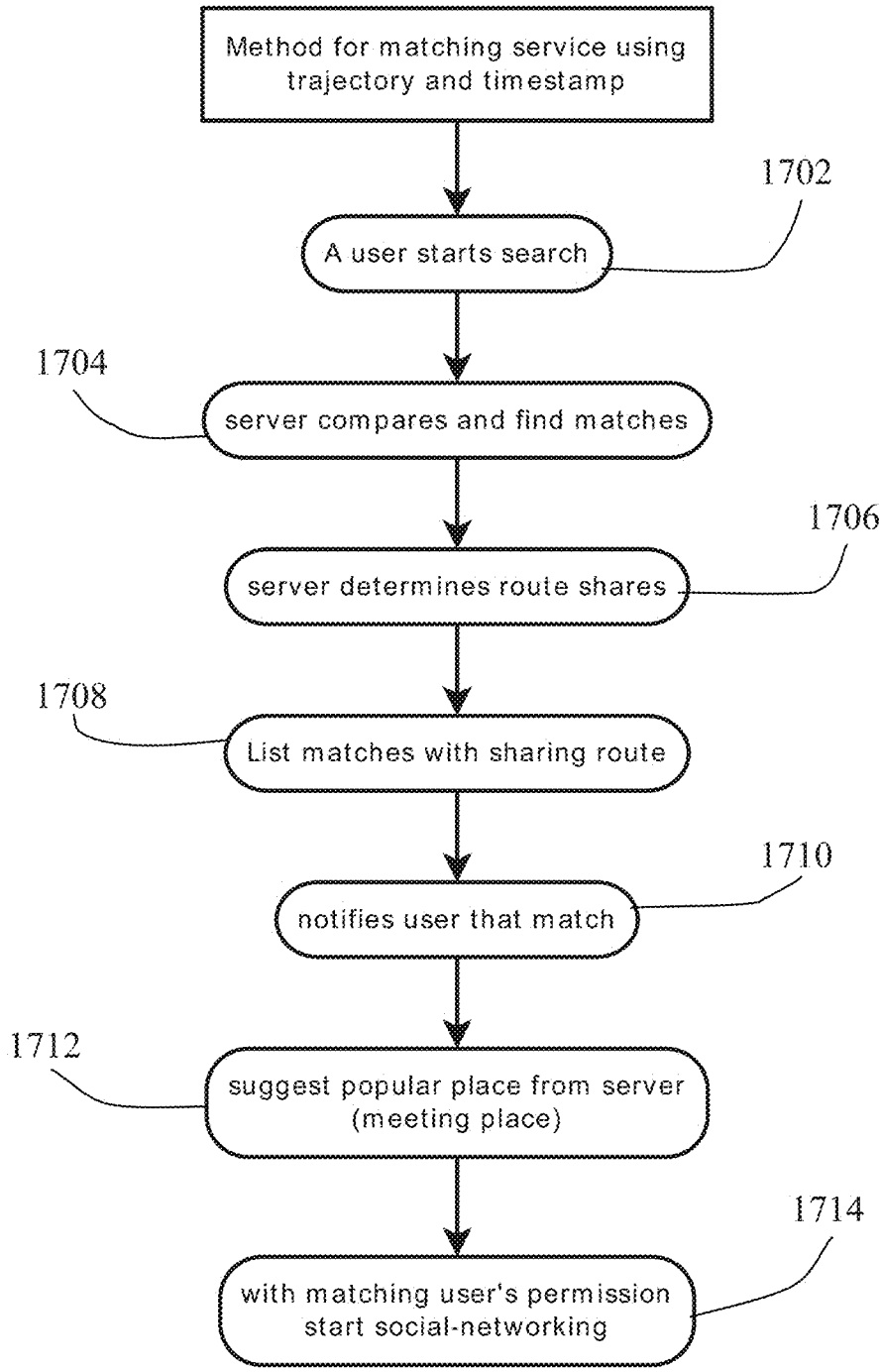

Method for matching service using trajectory and timestamp
1702
A user starts search
1704
server compares and find matches
1706
server determines route shares
1708
List matches with sharing route
1710
notifies user that match
1712
suggest popular place from server (meeting place)
1714
with matching user's permission start social-networking

Figure 17

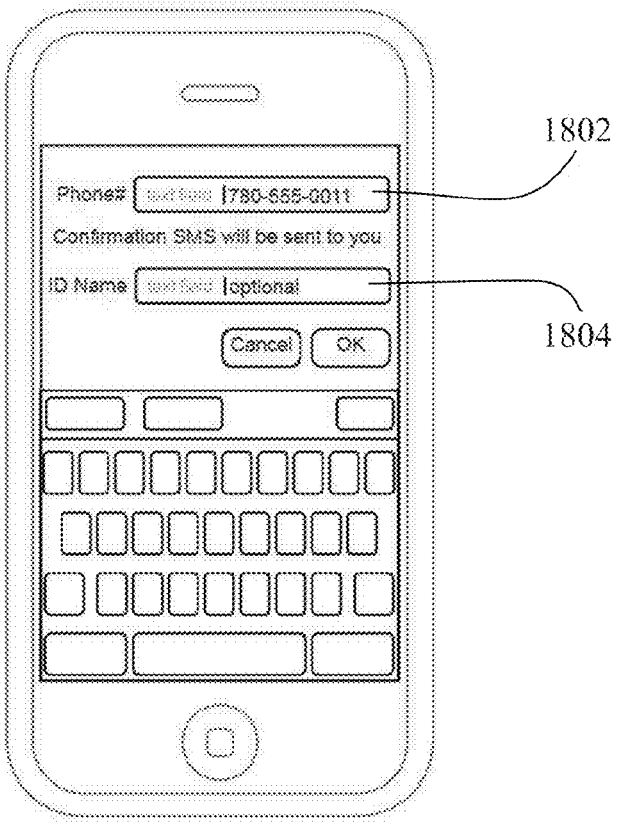


Figure 18

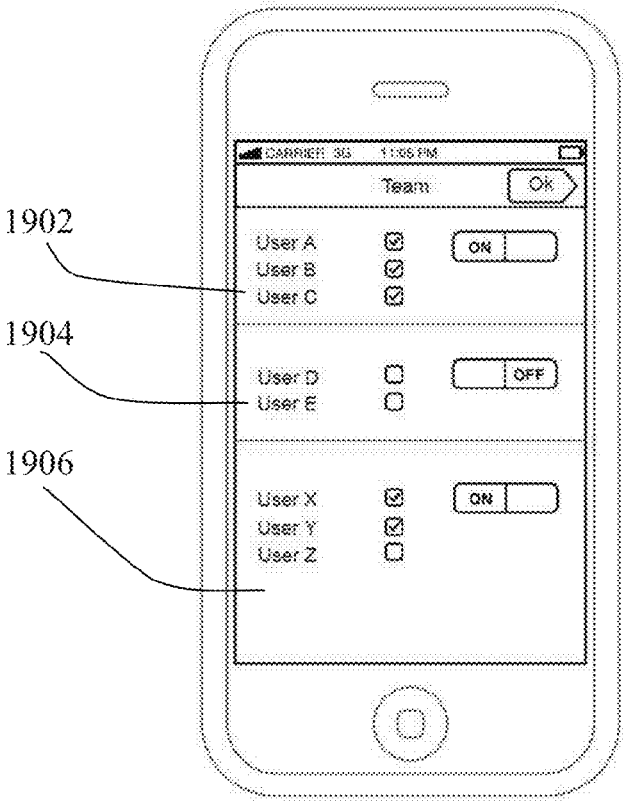


Figure 19

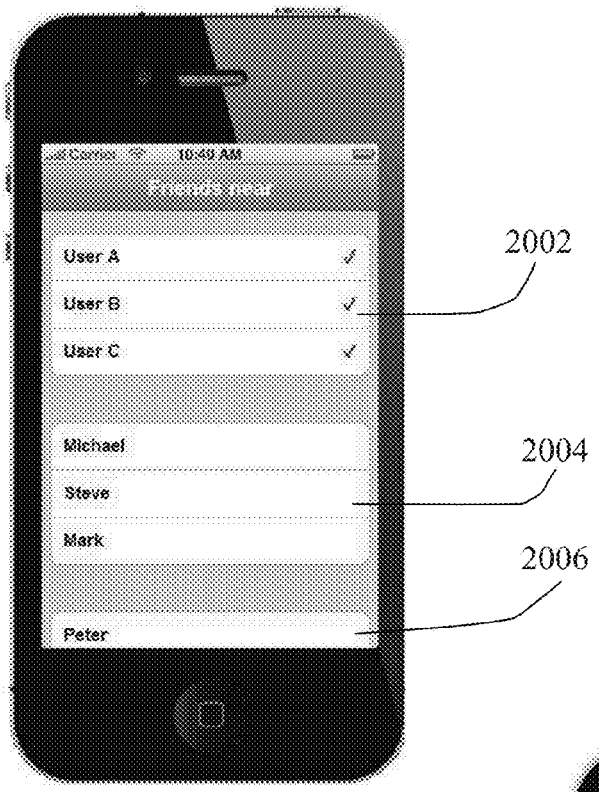


Figure 20

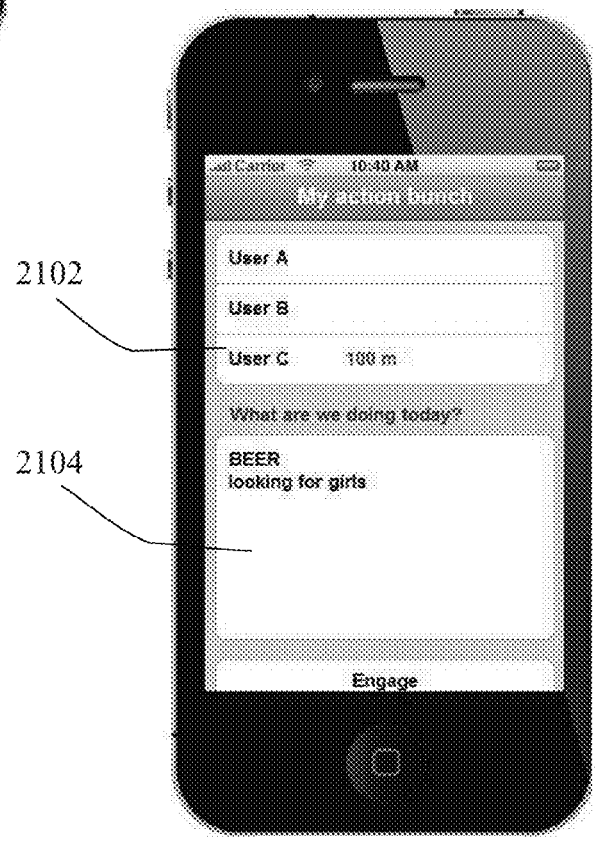


Figure 21

Figure 22

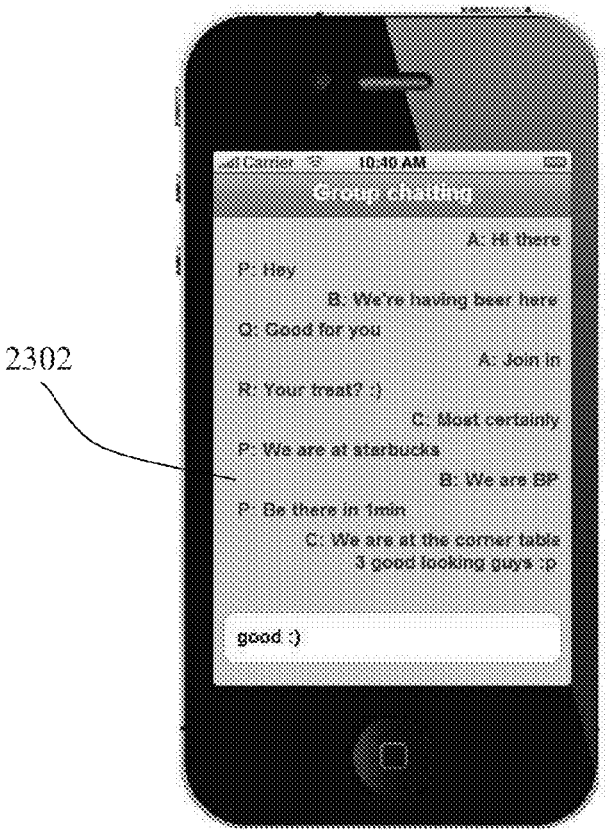


Figure 23

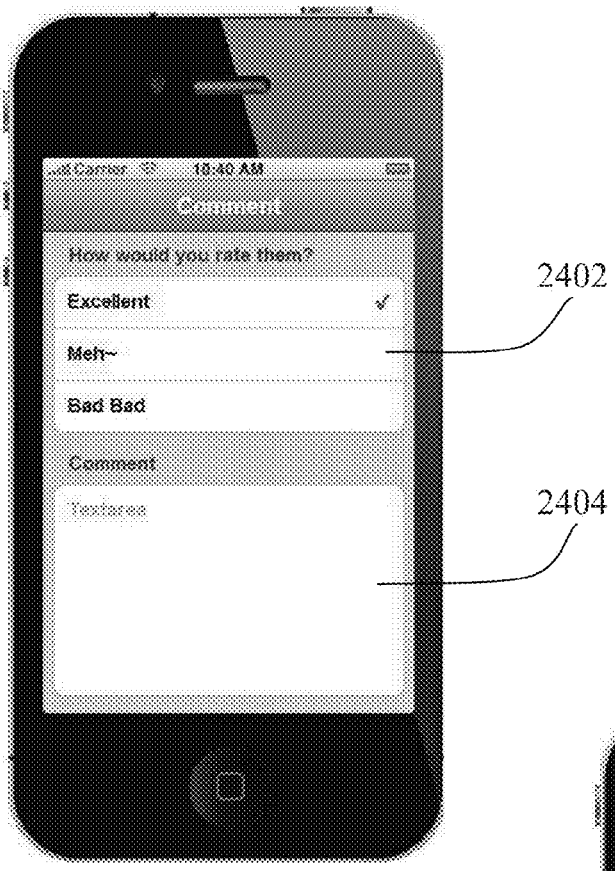


Figure 24

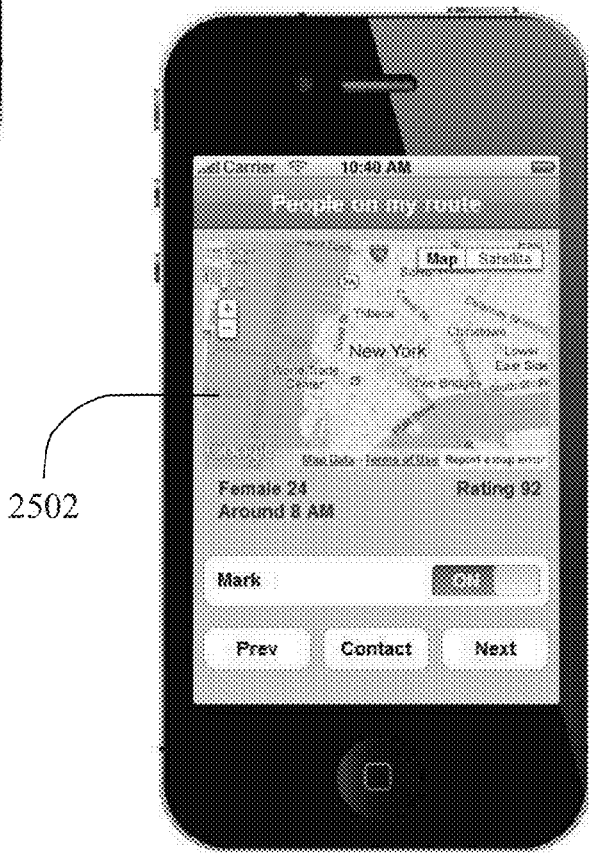


Figure 25

GROUP-BASED SOCIAL INTERACTION USING LOCATION-AWARE MOBILE DEVICES

FIELD

[0001] This relates to a method and apparatus for facilitating or initiating group-based social interactions using location-aware mobile devices.

BACKGROUND

[0002] United States Pre-Grant Publication No. 20110142016 (Chatterjee), entitled "Ad hoc networking based on content and location," describes a method of determining compatibility of two individuals, and provides a means of initiating communication between the users.

SUMMARY

[0003] There is provided a method of social interaction, comprising the steps of providing a network having a set of mobile devices associated with individuals; identifying a plurality of units of at least one subset of the set of mobile devices, at least one unit of the plurality of units comprising a group of mobile devices formed based on common social connections between individuals; characterizing the units by one or more characteristics; ranking a compatibility of units by comparing the one or more characteristics; causing at least one invitation or message to be transmitted over the network from a sending unit to a receiving unit; and sharing contact information of the units once an invitation has been accepted.

[0004] According to another aspect, the mobile devices may track geographic location.

[0005] According to another aspect, the social connections may comprise common contacts in a contact list stored on each mobile device.

[0006] According to another aspect, at least one unit may be a commercial enterprise. The commercial enterprise may transmit messages or invitations to units based on the one or more characteristics. The one or more characteristics may comprise at least one of: number of mobile devices in the at least one unit, current location, ages of the owners of the mobile devices, genders of the owners of the mobile devices, preferences of the at least one unit, shared preferences in profiles on mobile devices in the at least one unit, and historical trajectories. Statistics may be transmitted to the commercial enterprise representing the effectiveness of the messages or invitations to the commercial enterprise.

[0007] According to another aspect, the method may further comprise the step of characterizing the units comprises compiling at least one of characteristics entered after the unit has been identified and characteristics stored in the mobile device that are common to the mobile devices in each unit.

[0008] According to another aspect, the one or more characteristic may comprise at least one of: number of mobile devices in the at least one unit, current location, ages of the owners of the mobile devices, genders of the owners of the mobile devices, preferences of the at least one unit, shared preferences in profiles on mobile devices in the at least one unit, and historical trajectories.

[0009] According to another aspect, the method may further comprise the step of storing rankings for at least one unit based on feedback from another one or more units.

[0010] According to an aspect, there is provided a network for making social interactions. The network comprises a plurality of mobile devices associated with individuals, the mobile devices having transceivers for transmitting and receiving information, a data entry interface, a display, and a location sensor. A server is in communication with the mobile devices, the server having software that compares contact lists of the plurality of mobile devices to identify potential units that are within a predetermined radius of other mobile devices, the potential units comprising mobile devices with common contacts in the contact lists, and the software notifying the mobile devices of a potential unit and storing the potential unit as an active unit upon receiving approval from the mobile devices.

[0011] According to another aspect, at least one unit may be identified in the server as a preapproved unit, the preapproved unit being identified as an active unit server that forms the units automatically once the mobile devices are within the predetermined radius.

[0012] According to another aspect, the server software may further comprise instructions to rank units according to compatibility.

[0013] According to another aspect, compatibility may be determined based on factors selected from unit characteristics and location.

[0014] According to another aspect, unit characteristics may comprise at least one of: number of mobile devices in the active unit, current location, ages of the owners of the mobile devices, genders of the owners of the mobile devices, preferences of the active unit, shared preferences in profiles on mobile devices in the active unit, and historical trajectories.

[0015] According to another aspect, the server software may further comprise instructions to transmit invitations or messages to units for social interaction.

[0016] According to another aspect, the server software may further comprise instructions to transmit contact information once an invitation has been accepted.

[0017] According to an aspect, there is provided a method of social interaction, comprising the steps of: tracking a plurality of trajectories of more than one unit, each unit comprising one or more mobile devices having a location sensor and connected to a network; determining a pattern of trajectories for each of the more than one unit, the pattern of trajectories comprising locations, direction of travel, and times; ranking the compatibility of units by comparing the characteristics of each unit, at least one characteristic comprising the pattern of trajectories; and sending a message or invitation over the network to notify units of a potential social interaction.

[0018] According to another aspect, the message or invitation further comprises proposing a meeting place and time based on the pattern of trajectories of each unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] These and other features will become more apparent from the following description in which reference is made to the appended drawings, the drawings are for the purpose of illustration only and are not intended to be in any way limiting, wherein:

[0020] FIG. **1** is a schematic view of a network.

[0021] FIG. **2** is a schematic of the system used to track individuals with overlapping trajectories.

[0022] FIG. **3** is a schematic depicting a grouping process.

[0023] FIGS. **4-6** are examples of connections between individuals based on a contact list.

[0024] FIGS. **7** and **8** are flow charts of the steps in a grouping method.

[0025] FIGS. **9** and **10** are flow charts of the steps in a group-to-group social interaction.

[0026] FIG. **11** is a flow chart of the lifecycle of a group-to-group social interaction.

[0027] FIG. **12** is a flow chart of a user's location being tracked by the method.

[0028] FIG. **13** is a flow chart of the steps in a server relayed social interaction.

[0029] FIG. **14** is a flow chart of the steps in a business-to group-interaction.

[0030] FIG. **15** is a flow chart of the steps in introducing a group to another group.

[0031] FIGS. **16** and **17** are flow charts of the steps in a method to pair individuals based on trajectories.

[0032] FIGS. **18-25** are screenshots of a mobile device used to implement the flowcharts described above.

DETAILED DESCRIPTION

[0033] This relates to a method and apparatus for facilitating or initiating group-based social interactions. Individuals are grouped using known relationships or by cross-referencing using an existing list of contacts, such as from a list of contacts that a person may maintain in a smart phone or other electronic device, or from a social network. An event or promotion may then be initiated based on the group's location, proximity to other groups, etc. as will be apparent from the description below, and may involve another group or an organization such as a business. Other aspects and details will be apparent from the description below. While groups are described below in a preferred embodiment, it will be understood that each group may be considered a "unit," and other units may include individuals or commercial enterprises that may interact with other units made up of individuals or other groups as well.

[0034] The examples discussed below are with respect to a mobile device such as a smart phone that can locate an individual using GPS or based on the proximity to cell phone towers. Furthermore, the grouping is done by cross-referencing an individual's list of contacts. This may be on the mobile device, but it may also be on a separate device that also interacts with a server, or on the server itself. Variations, such as other types of mobile devices, other approaches to determining location, etc., will be apparent to those skilled in the art, and the method and apparatus may be modified accordingly.

[0035] In one example, the method relates to a location-based many-to-many social interaction. Particularly, using a new computerized method of grouping friends and colleagues. The apparatus that employs the method may use a server or through peer-to-peer networking using the mobile devices themselves.

[0036] Referring to FIG. **1**, there is shown an example of a network that may be used. The network includes mobile devices **12** in communication with a wireless antenna **14**. As mentioned above, mobile devices **12** are capable of determining their location, either by proximity to one or more antennas (such as a cell tower), by GPS, or by other techniques that allow the user's location to be determined. As depicted, mobile devices **12** are grouped into groups **16**, as will be described in more detail below. Wireless antenna **14** are preferably in communication with servers **18** and databases **20**. These may be controlled by the service provider and used, for example, to keep groups and individuals anonymous until the decision is made to meet, and to manage the transmission of messages between groups or individuals. There may also be other users **22** connected in the network, such as individuals or businesses that can send messages, advertise, etc. These may be connected over a wireless or wired connection.

[0037] Grouping method—Grouping people is done using computerized devices' contacts or address books **19**. A group is preferably made from reviewing the contacts in an individual's contact list, and identifying individuals common to all. For example, referring to FIG. **3**, from User A **22**A has User B **22**B and User C **22**C in their contact list, while User B **22**B has User A **22**A and User C **22**C, and User C **22**C has User A **22**A and User B **22**B. In this case, Users A, B, and C **22**A, **22**B, and **22**C all know each other and are placed in a group. As can be seen, there are other contacts in each of the contact lists **19** for Users A, B, and C **22**A, **22**B, and **22**C. Even if these individuals were present, they would not be placed into the group with Users A, B, and C **22**A, **22**B, and **22**C, as they are not known by the entire group. Contacts may be a phone number (mobile or fixed), an email address, etc. Group members may also be manually added or removed. A person may have several groups and may be in several groups. Alternatively, a person may be required to select a group that they will be a part of at any given time. This type of arrangement is depicted in FIG. **4**, where each node **21** of a network **23** is connected with other nodes, making a group of up to six users possible. Referring to FIGS. **5** and **6**, this is not the case. In these examples, there would be six possible groups of only two users each.

[0038] Referring now to FIG. **7**, there is shown a flow chart of the overall process involved in establishing a group. In step **702**, User A signs up, and User A's contact information is sent to the server in step **704**. User B signs up and similarly has the contact information sent to the server in steps **706** and **708**, respectively. At this point, since User A and User B both have each other in their contact list, the server will identify a possible group with User A and User B and may notify the users, depending on the preferences. In steps **712** and **714**, User C signs up and has the contact information sent to the server. The server then sets up a possible group of Users A, B, and C and notifies the users. The users then have the option of refining the groups in steps **718**, and the groups are saved. The group may be stored on the server, on the respective devices of each user, or both.

[0039] Referring now to FIG. **8**, the grouping method is shown in more detail. Once the method starts, each user's contact list is reviewed and cross-referenced or compared to other user's contact lists in steps **802** and **804** to see whether there are any similarities. At step **806**, the common contacts are then grouped together. This is preferably done as described above, where groups are only formed by users that appear in every other user's contact list. Depending on the contact lists and the users present, there may be more than one group formed, or a user may be prompted to decide what group they wish to join. Alternatively, rather than grouping A, B, and C, the group may be refined to A and B, or B and C. If desired, another option may be to set up a "sub-group" within a group. At step **808**, members may be added or removed from a particular group. For example, a guest that may not be known to everyone or that may not appear in everyone's contact list may be manually added to the group. This may be done by amending the group to include the other person, which may be necessary if the person does not have a mobile device or is not in everyone's contact list, or by having one user send out the contact information for the user to be added

to the other group members through the system to be accepted by the others. At step **810**, the defined groups may be defined and saved for later use. Once a group has been defined, it may not be necessary to prompt for the group to be formed or to accept the group at a later date. Instead, the group may automatically form when the users come into close proximity with each other.

[0040] Social interaction—The purpose of forming the groups is to facilitate or initiate interactions with the group. Once grouped, the group can engage socialinteraction. The number of member engaging social interaction may not necessarily be the same number of the group. For example, on a certain occasion, only three friends from a five member group may hang out. In this example, they will be engaging social interaction as a 3-people group (Group-**01**) for the occasion. When another 3-people engaged group (Group-**02**) is looking for a group for social-interaction, 'Group-**01**' will be one of matching groups.

[0041] When a group (Group-**01**) searches other groups, it may look for characteristics such as: same number of members in a group, proximity of groups, etc. Attributes of groups may also be considered in searching, as specified by the groups. A group's attributes may be determined by a tag specified by the group, or by common attributes among engaged members. Tagging may be done by members in the group or others to characterize the group. Alternatively, or in addition, common attributes shared among the members of the group may be determined automatically by a computer, server or the mobile devices as they communicate. For example, if all members of the group are male or like basketball, the group may be tagged with "male" or "basketball" without having to enter the tag.

[0042] A group will be a unit for a social-interaction. For example, a group of a certain number of people that want to play street basketball can find another group of the same number of people nearby. In this example, the former would initiate interaction by looking for groups with same number of people near with keyword or message containing "street basketball". The message will be posted and with a high priority to near-same-number-grouped people, and searchable. Near groups with a certain tag will be notified with permission. A notification may be done through a server, peer-to-peer network, or instant message services, such as SMS. Other ways of sending notifications may also be used, as will be recognized by those skilled in the art.

[0043] Referring now to FIG. **9**, an example of social networking is shown. The first step in **902** is to form a group, where the mobile devices detect the proximity of other individuals in their contact list, or are added manually if they do not have a mobile device. A user's proximity may be determined by logging the location periodically, such as every 15 minutes, then comparing this location with other users. If each user's last location is within a certain distance, such as 20 meters, they may be considered "close, and available to be grouped. The time and distance may be varied, and the detection may be prompted manually if the users wish to recognize their group more quickly. At step **904**, the users may be prompted to select a group, moving to steps **906** and **908**, where the group is selected and engaged, or formed automatically, moving to steps **910** and **912**, where the group is automatically formed based on the users present. The default will preferably be to prompt for the group, but will depend the preferences stored by the users.

[0044] At step **914**, the group is identified and the members are "engaged" in the group. Once engaged, the group may be ready for social networking, and is searchable by other groups. The group will preferably be searchable first by the group size, but may also be searchable based on other criteria.

[0045] The group may then tag themselves with their current interest. In the example in step **816**, a user in the group has tagged the group with "dance, in which case the system will search for other groups with the "dance" tag, or "dance" attributes. Generally, attributes may be considered to be interests or characteristics found in the profile of an individual or group profile (for example, one user may have one stored group with a "basketball" attribute, another group with a "dance" attribute, and either group may be tagged with "beer," depending on their particular interests). The social interaction between different groups occurs in step **918**. The history of interactions may be stored in the server as well. This may be used to give a higher priority to a particular group that interacts more frequently, or mark a group as "active" for future reference. It may also recognize other groups that the group has interacted with before. The system may also permit a group to be ranked or commented on.

[0046] More detail related to interactions between groups is shown in FIG. **10**. In step **1002**, a user may perform a search on behalf of the group. The search in step **1004** may be conditional on certain tags, leading to step **1006**, or unconditional, leading to group **1008**. The conditional search may be useful, for example, when searching for dance partners, or dance partners of a particular gender. The size of groups may then be compared at step **1010**. In step **1012**, the results are ranked according to distance and compatibility. In step **1014**, a user on behalf of one group may send a message to another group, which may be transmitted to the entire group, or to a designated member of the group. A reply occurs in step **1016**, and a decision is made whether to interact or not. Up to this point, the interaction is preferably anonymous aside from attributes or tags, with more information being shared if interaction occurs.

[0047] Referring to FIG. **11**, the overall lifecycle of a group is depicted. Once a group is formed in step **1102**, the group is either engaged at step **1104**, at which point it is prepared to move on to social interaction with another group at step **1106**, and then becomes disengaged at step **1108**. The group will be prepared to engage in social interaction again once the group becomes engaged again in step **1104**. Of course, it is possible to disengage the social interaction with another group while maintaining the same group, i.e. moving from step **1106** back to **1104**. Referring to FIG. **12**, the lifecycle of a user's location is shown. Once signed in at step **1202**, the user's location is time stamped at step **1204**. The location may be time stamped again if the user moves a certain distance (step **1206**) or after a certain time period (**1208**). This continues until the user logs out at step **1210**.

[0048] System interface—Referring to FIGS. **18-24** depict examples of screenshots related to various steps taken to establish a group and interact with other groups. FIG. **18** depicts a sign-up screen, where a user confirms their phone number at field **1802**, which will be a unique identifier. An optional ID name may be entered in field **1804**. In FIG. **19**, the groups are fine-tuned, and various groups are selected. For example, in box **1902**, users A, B, and C were accepted as a group, while in box **1904**, the group was rejected, and in box **1906**, only two possible group members were included in the group. Once the group is formed, messages may be sent to the

group members as confirmation. Referring now to FIG. **20**, a screenshot of a device is shown, where friends in a group that are close are shown. This may also be based on pre-defined groups, such as groups **2002**, **2004**, and **2006**, and may be useful in determining when everyone has arrived, or may indicate the distance of each member from the group. Referring to FIG. **21**, once the group has been defined in area **2102**, the current theme or tags may be set in a text box **2104**. This may be visible to other groups. Referring to FIG. **22**, after the group has been formed, other groups in close proximity are shown in a list **2202**, ranked in order of compatibility. By selecting a particular group, more information can be seen. The groups may be located on a map **2204**, which may also control the groups shown in list **2202**. For example, by zooming in or out, the number of groups displayed may change. In one example, any group with a person found to be equal or less than two or three degrees of separation may be indicated. In addition, previous interactions may also be indicated. Referring to FIG. **23**, once interaction has been initiated, the groups may participate in an anonymous chat **2302**, with messages from one group on one side of the screen (e.g. A, B, C messages appear on the right), and the other group on the other side (e.g., P, Q, R messages appear on the left). Referring to FIG. **24**, after or during the interaction, the group may be rated **2402** in various ways, and an optional comment section **2404** may be included.

[0049] One-to-many social-interaction—This example may be particularly location based, and may be used for localized instant gathering or instant emergency response. A person may initiate a gathering with a message containing what kind of gathering he or she wants. The message will be posted and searchable to people that are near. With a user's permission, it will be notified to the person with relating attributes. For example, the person may issue an emergency situation about car accident, which will then be posted and searchable to people that are near. Another person near with an 'emergency response' tag or attribute will be notified if the person allows a notification who happened to be a firefighter off duty hanging around nearby with emergency situation expertise could come for help. Exact location of the accident can be revealed if necessary. This may also be used to create a "social mob", where a person may send a notification that something of particular interest was found. A notification may then be sent to those open to receiving these types of notifications.

[0050] Location based social commerce (business to group interaction)—This example may be used to connect groups close to a particular business. For example, a business may target specific groups based on size or interests, or tailor their event or promotion to a group that is in a particular area. Traditionally, this kind of search occurs in the other way, where a user initiates a search by looking around for a point of interest. However, in this suggested method, a business may initiate the search by looking for a target market/people and tailor the promotion or event accordingly. For example, a business may look up how many of groups consisting a certain number of people are near. The business may be provided with information such as how many groups in the area are likely take offers or events by checking history of accepting offers of the groups. Once a business decides on the target group or groups, it can send out offers or events through an instant message or email. In this case, the business would likely reveal its contact and street address or exact location determined by GPS.

[0051] Referring to FIG. **14**, an example of a flow chart for this approach is depicted. In step **1402**, a business may be notified, either by push notifications (alerts) or by request. In step **1404**, a business may tailor the event or promotion for the groups in the area. For example, a business may target certain groups with a certain number of members, specific attributes or tags, etc. This promotion may then be stored in the server at step **1406**, and at step **1408**, groups are notified of the promotion when they are within a specified distance of the promotion. The distance may be flexible, and may depend on the groups characteristics (e.g. access to a vehicle, on foot, etc.). At step **1410**, a group may also search for specific events, which are then listed so a user can search and review. At step **1412**, the users or groups accept the promotion, and at step **1414**, feedback, such as acceptance ratio, attributes of those that accept, ratings, comments, etc. may be reported to the business.

[0052] One-to-one social-interaction—Referring to FIG. **13**, an example of one-to-one social interaction is shown. In step **1302**, User-A may be notified, or may search for, another user (User-L) that may be interacted with. At step **1304**, User-A sends a message to User-L and at step **1306**, User-L is notified. Note that, in this example, it may be that User-A and User-L may not know each other. A user may hide their status if they do not wish to interact, or may blacklist users if they wish to avoid all contact with a particular user. At step **1308**, once notified, User-L can either accept User-A's invitation and move to step **1310**, or reject the invitation and move to step **1312**. At step **1312**, if the individuals move apart without making a decision or the invitation is rejected, the connection between the users is broken and no further communication is possible. At step **1310**, if the invitation is accepted, a connection may be set up between the users using a variety of approaches, such as instant messaging, SMS, voice, video, Skype®, etc. Preferably, until both users indicate their willingness, no personal information is shared. In other words, the contact is anonymous until step **1310**. Alternatively, User A may share contact information with their initial contact in step **1304**.

[0053] Social networking based on common trajectories—One example of one-to-one social interaction is based on common trajectories rather than proximity at a point in time, where people or groups are connected based on trajectory history. While the discussion below is in the context of one-to-one interaction, it will be understood that similar principles also apply to groups. However, as groups are more likely to be stationary at a single location, it is more likely to be applied to individual.

[0054] A person may find or be notified of another person sharing a common path or crossing. Using a person's trajectory saved in a server or a mobile device, the person's repeating path at a certain time period can be determined. For example, during weekdays, the commute route can be determined with user's saved trajectory. Another person who may share a part of the route at the same time period can be found. With high priority and with common attributes and percent of portion sharing trajectory, most appropriate people can be found. One example of this application may be identifying a potential car-pooling group. Another example is shown in FIG. **2**, where User 'A', male, commutes from Clark St. to Times Square in the morning weekdays and User 'X', female, commutes from Fulton St. to Times Square. The system compares the times and trajectories and if a match occurs, may notify 'A' and 'X' of another person sharing their trajectory.

The notification may also be based on whether the other person meets predetermined criteria of who each user is willing to interact with.

[0055] An example of pairing based on trajectories is shown in FIG. **16**. In one example, the device records the user's travel trajectory and timestamp. This is done by determining the user's location by the mobile device at step **1602**. If the device is not connected to the servers, or is not logged in at step **1604**, the device records the location or trajectory and timestamp at step **1606**, and repeats the process. Once the device is logged in to the server, the location and timestamp information is uploaded to the servers at step **1608**. This information is then used to consider the user's trajectory and travel plan.

[0056] An example of a flow chart is shown in FIG. **17**. In step **1702**, a user initiates a search, and the server compares routes in step **1704**. In step **1706**, the server decides whether the route is a common route, and then lists shared routes in step **1708**. The list may be ranked according to, for example, the similarity of the route, time the route is taken, the compatibility of the users, and the preferences indicated by each user. The tolerances may be adjusted based on preferences and experience. In step **1710**, the users are notified of a potential match, and at step **1712**, the server may recommend a popular meeting place that is close to the shared route match. After that, at step **1714**, the users may share contact information or not, and each user may rate or comment the meeting, and/or the quality of the location.

[0057] An example of an interface is shown in FIG. **25**, where a map **2502** is shown, which may depict the user's route and the common trajectory of other users. Details of the other users may appear in association with that route, such as the age, gender, etc. as well as the timeframe and rating, comments, etc. The screen also provides options to contact this person (e.g. SMS, MMS, IM, etc., preferably anonymously through the server), or move to search for another user.

[0058] Location-based ad-hoc chatting—The system may also permit ad-hoc chatting between groups or users. Referring to FIG. **15**, at step **1502**, a user (either an individual or on behalf of a group) starts looking for another unit (e.g. individual or group). At step **1504**, the search may be for groups with the same number of members within a particular geographic area and at step **1506**, the groups are listed based on their proximity, compatibility, etc. At step **1508**, the requester may be automatically matched, where the system chooses the highest ranked unit at step **1510**, or the requester may be prompted to make the choice at step **1512**. The server then notifies the unit at step **1514** of the invitation, and the invitation is either accepted or rejected at step **1516**. Once the invitation is accepted, chatting starts at step **1518**.

[0059] Server relayed social interaction—To alleviate privacy concerns, initial social-interactions are preferably server relayed, such that no direct contact will be revealed to the other groups or persons. Using this approach, one party wouldn't know who exactly they found through a search and wouldn't get any contact information but through server relayed interaction. Server relayed interactions may include voice chatting, instant messages, etc. One consequence of this is that, if one party found another party through a search but decided not to interact with them at the moment, in general they would not be able to contact that group later once either party is out of the search range. An option to make a direct contact may be provided if a user wanted to reveal the contact. For example, a business participating in social commerce through this system would want to reveal its contact, or if the group wanted to share contact information after making an initial anonymous contact.

[0060] In this patent document, the word "comprising" is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded. A reference to an element by the indefinite article "a" does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there be one and only one of the elements.

[0061] The following claims are to be understood to include what is specifically illustrated and described above, what is conceptually equivalent, and what can be obviously substituted. The scope of the claims should not be limited by the preferred embodiments set forth in the examples, but should be given the broadest interpretation consistent with the description as a whole.

1. A method of social interaction, comprising the steps of:
- providing a network having a set of mobile devices associated with individuals;
- identifying a plurality of units of at least one subset of the set of mobile devices, at least one unit of the plurality of units comprising a group of mobile devices formed based on common social connections between individuals;
- characterizing the units by one or more characteristics;
- ranking a compatibility of units by comparing the one or more characteristics;
- causing at least one invitation or message to be transmitted over the network from a sending unit to a receiving unit; and
- sharing contact information of the units once an invitation has been accepted.

2. The method of claim **1**, wherein the mobile devices track geographic location.

3. The method of claim **1**, wherein the social connections comprise common contacts in a contact list stored on each mobile device.

4. The method of claim **1**, wherein at least one unit is a commercial enterprise.

5. The method of claim **4**, wherein the commercial enterprise transmits messages or invitations to units based on the one or more characteristics.

6. The method of claim **5**, wherein the one or more characteristics comprise at least one of: number of mobile devices in the at least one unit, current location, ages of the owners of the mobile devices, genders of the owners of the mobile devices, preferences of the at least one unit, shared preferences in profiles on mobile devices in the at least one unit, and historical trajectories.

7. The method of claim **5**, further comprising the step of transmitting statistics representing the effectiveness of the messages or invitations to the commercial enterprise.

8. The method of claim **1**, wherein characterizing the units comprises compiling at least one of characteristics entered after the unit has been identified and characteristics stored in the mobile device that are common to the mobile devices in each unit.

9. The method of claim **1**, wherein the one or more characteristic comprise at least one of: number of mobile devices in the at least one unit, current location, ages of the owners of the mobile devices, genders of the owners of the mobile

devices, preferences of the at least one unit, shared preferences in profiles on mobile devices in the at least one unit, and historical trajectories.

10. The method of claim **1**, further comprising the step of storing rankings for at least one unit based on feedback from another one or more units.

11. A network for making social interactions, comprising:

a plurality of mobile devices associated with individuals, the mobile devices having transceivers for transmitting and receiving information, a data entry interface, a display, and a location sensor; and

a server in communication with the mobile devices, the server having software that compares contact lists of the plurality of mobile devices to identify potential units that are within a predetermined radius of other mobile devices, the potential units comprising mobile devices with common contacts in the contact lists, the software notifying the mobile devices of a potential unit and storing the potential unit as an active unit upon receiving approval from the mobile devices.

12. The network of claim **11**, wherein at least one unit is identified in the server as a preapproved unit, the preapproved unit being identified as an active unit server that forms the units automatically once the mobile devices are within the predetermined radius.

13. The network of claim **11**, wherein the server software further comprises instructions to rank units according to compatibility.

14. The network of claim **13**, wherein compatibility is determined based on factors selected from unit characteristics and location.

15. The network of claim **14**, wherein unit characteristics comprise at least one of: number of mobile devices in the active unit, current location, ages of the owners of the mobile devices, genders of the owners of the mobile devices, preferences of the active unit, shared preferences in profiles on mobile devices in the active unit, and historical trajectories.

16. The network of claim **11**, wherein the server software further comprises instructions to transmit invitations or messages to units for social interaction.

17. The network of claim **11**, wherein the server software further comprises instructions to transmit contact information once an invitation has been accepted.

18. A method of social interaction, comprising:

tracking a plurality of trajectories of more than one unit, each unit comprising one or more mobile devices having a location sensor and connected to a network;

determining a pattern of trajectories for each of the more than one unit, the pattern of trajectories comprising locations, direction of travel, and times;

ranking a compatibility of units by comparing characteristics of each unit, at least one characteristic comprising the pattern of trajectories; and

sending a message or invitation over the network to notify units of a potential social interaction.

19. The method of claim **18**, wherein sending a message or invitation further comprises proposing a meeting place and time based on the pattern of trajectories of each unit.

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