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(54) **HUB COORDINATION SERVICE**

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(71) Applicant: **Microsoft Technology Licensing, LLC**,
Redmond, WA (US)

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(72) Inventors: **Joseph H. Matthews, III**, Woodinville,
WA (US); **Lavanya Vasudevan**,
Sammamish, WA (US); **Shawn M.**
Thomas, Redmond, WA (US); **Joseph A.**
Schrader, Kirkland, WA (US); **Ted**
Tai-Yu Chen, Seattle, WA (US); **Raman**
K. Sarin, Redmond, WA (US)

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(73) Assignee: **Microsoft Technology Licensing, LLC**,
Redmond, WA (US)

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Primary Examiner — Andrea Leggett

(74) *Attorney, Agent, or Firm* — Judy Yee; Micky Minhas

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(57) **ABSTRACT**

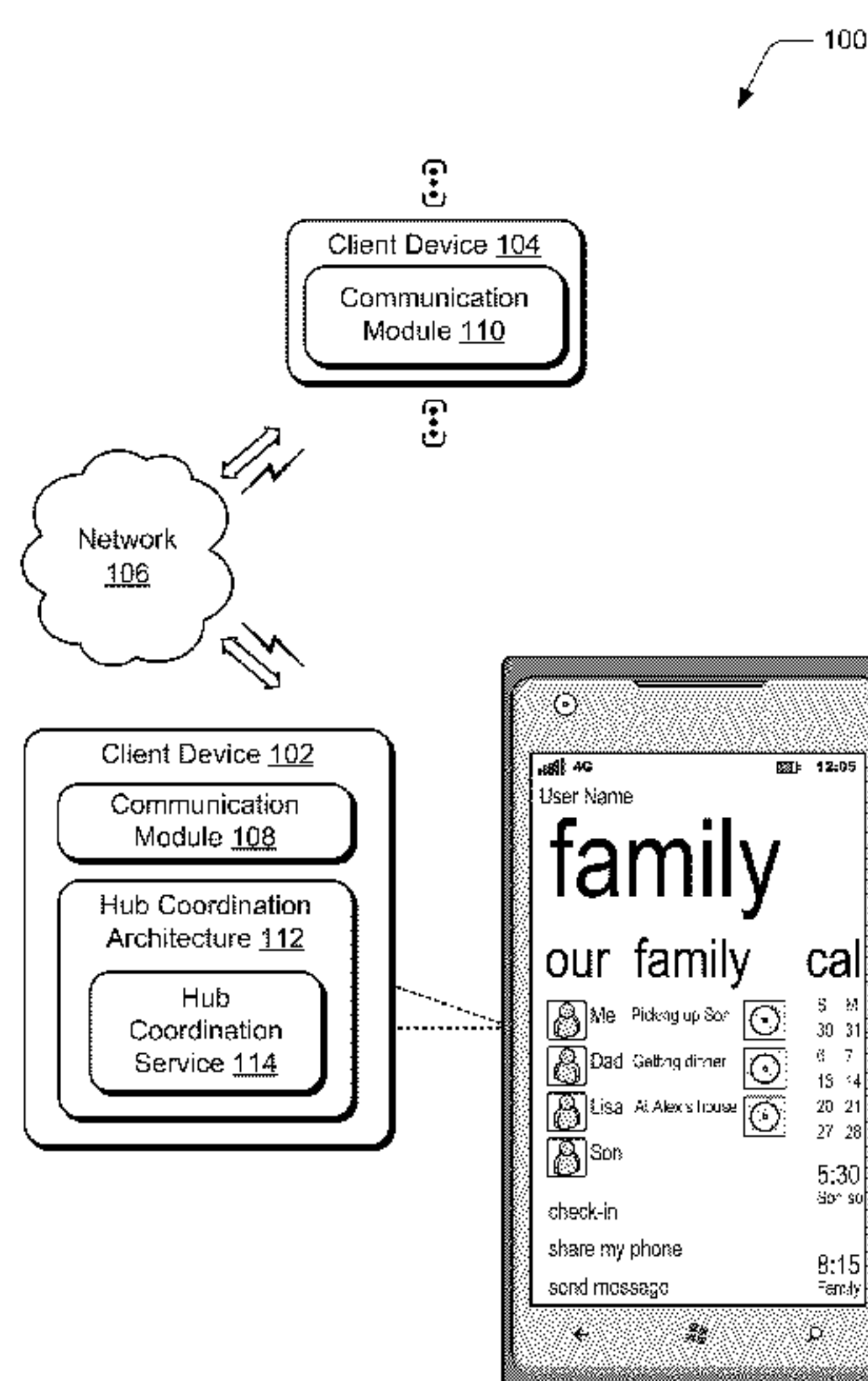
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In implementations of a hub coordination service, a device
includes a communication interface for communication coord-
ination with one or more associated devices of the device,
and the associated devices correspond to hub members. A hub
manager is implemented to receive a task input to create a task
for one or more of the hub members to complete. The hub
manager can register the task in a hub that is a private, shared
space of the hub members, and then initiate communication
of the task to respective associated devices of the one or more
hub members for notification of the task to be completed.

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14 Claims, 10 Drawing Sheets



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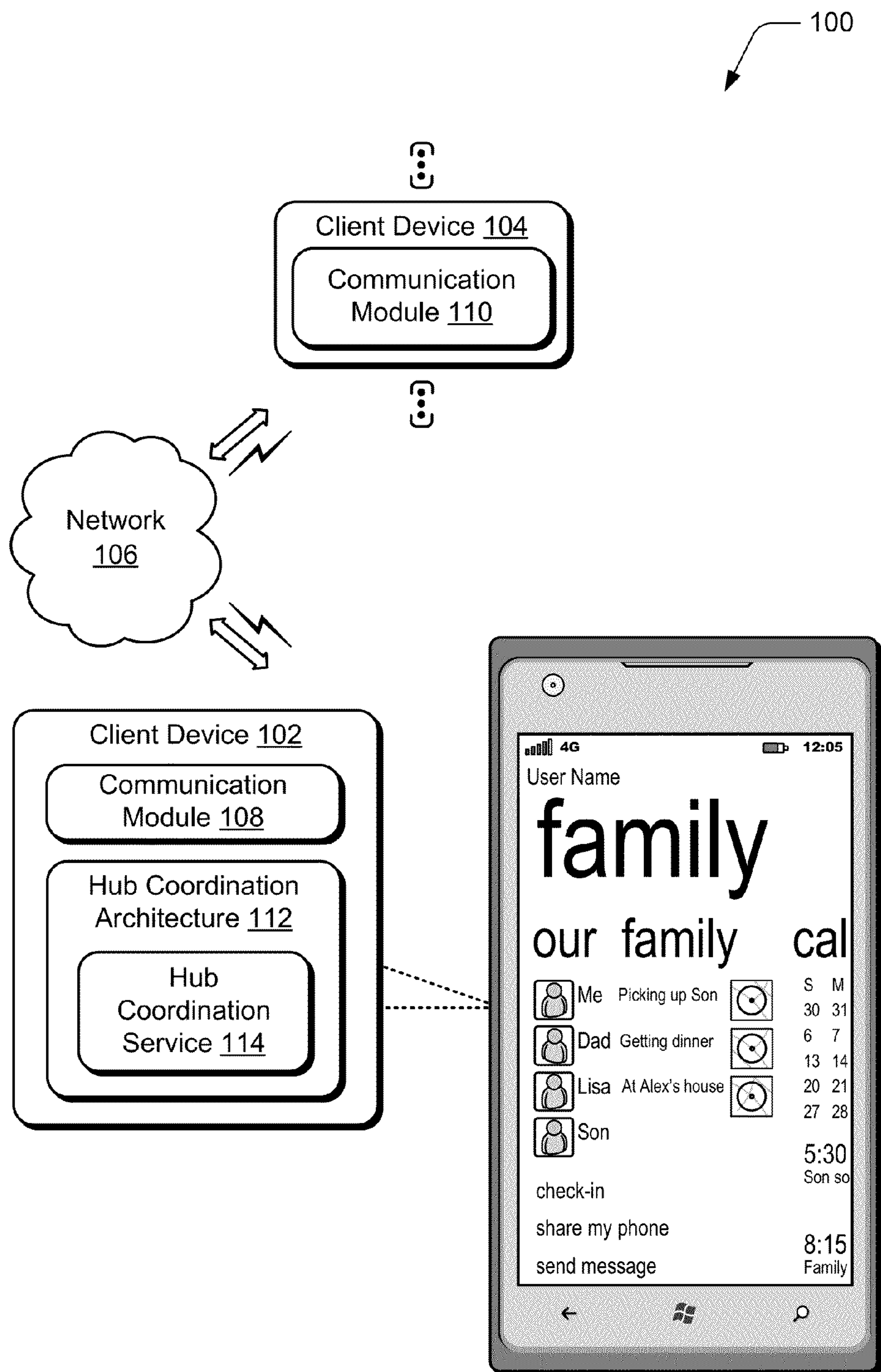
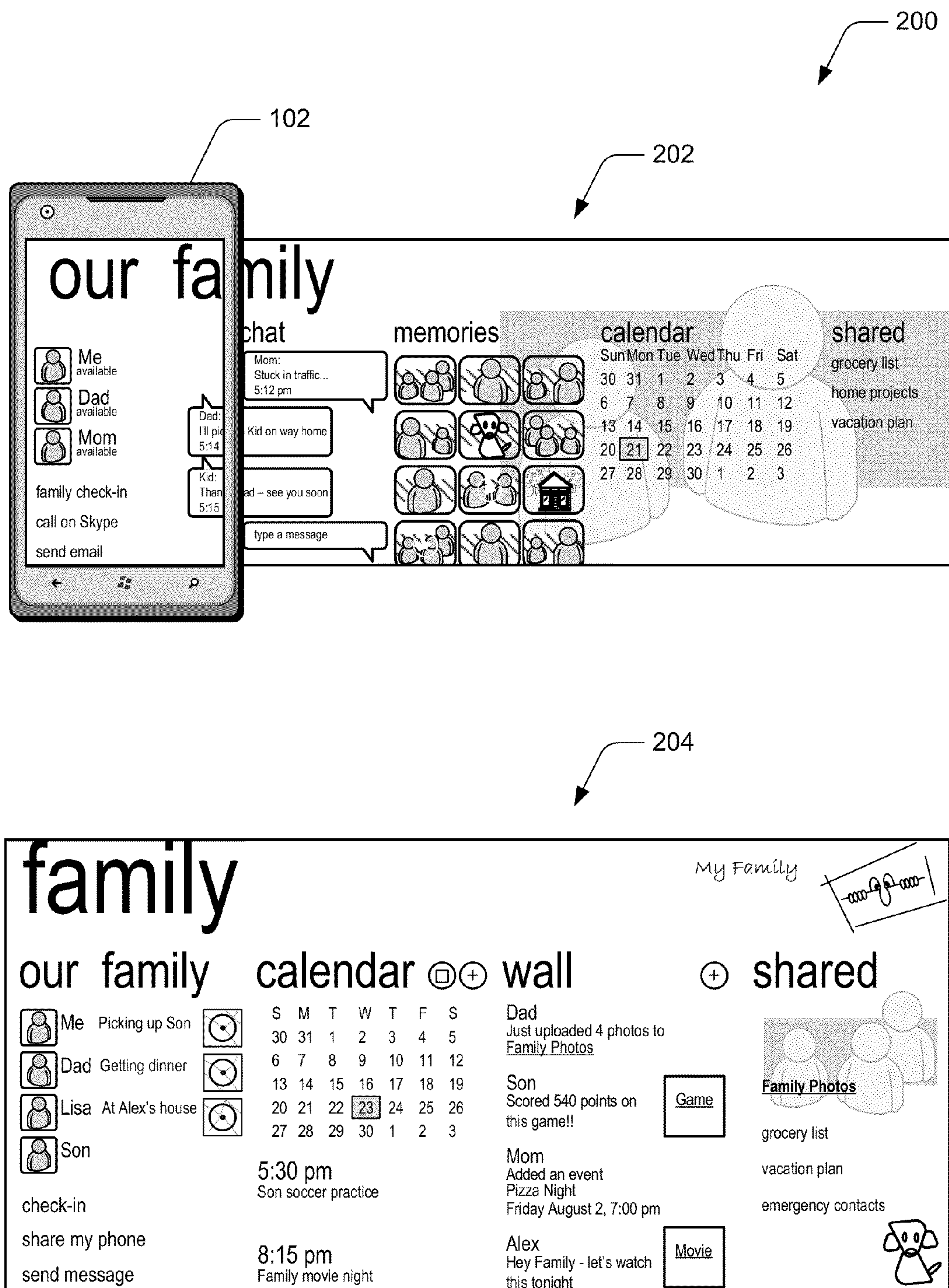


FIG. 1



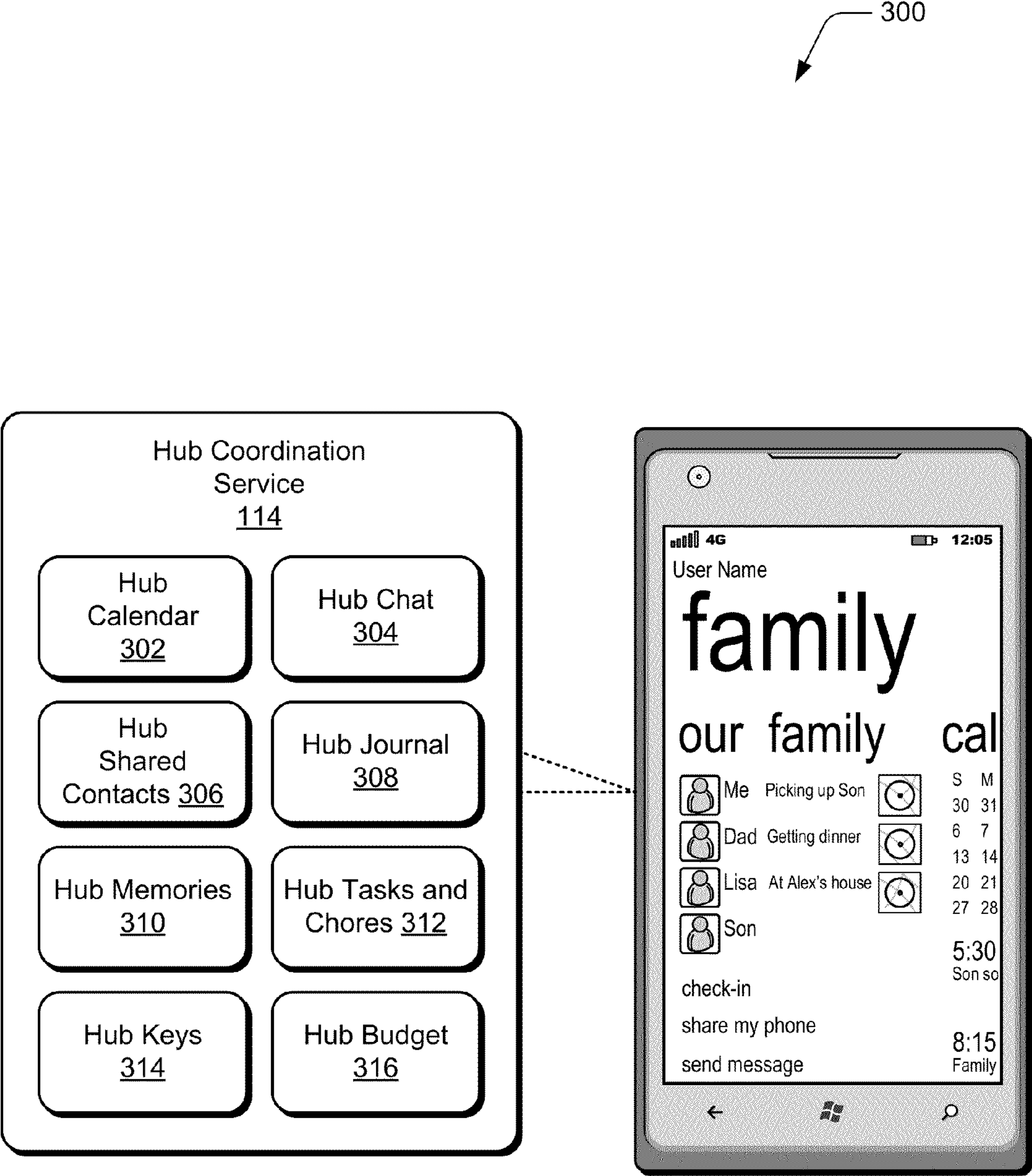
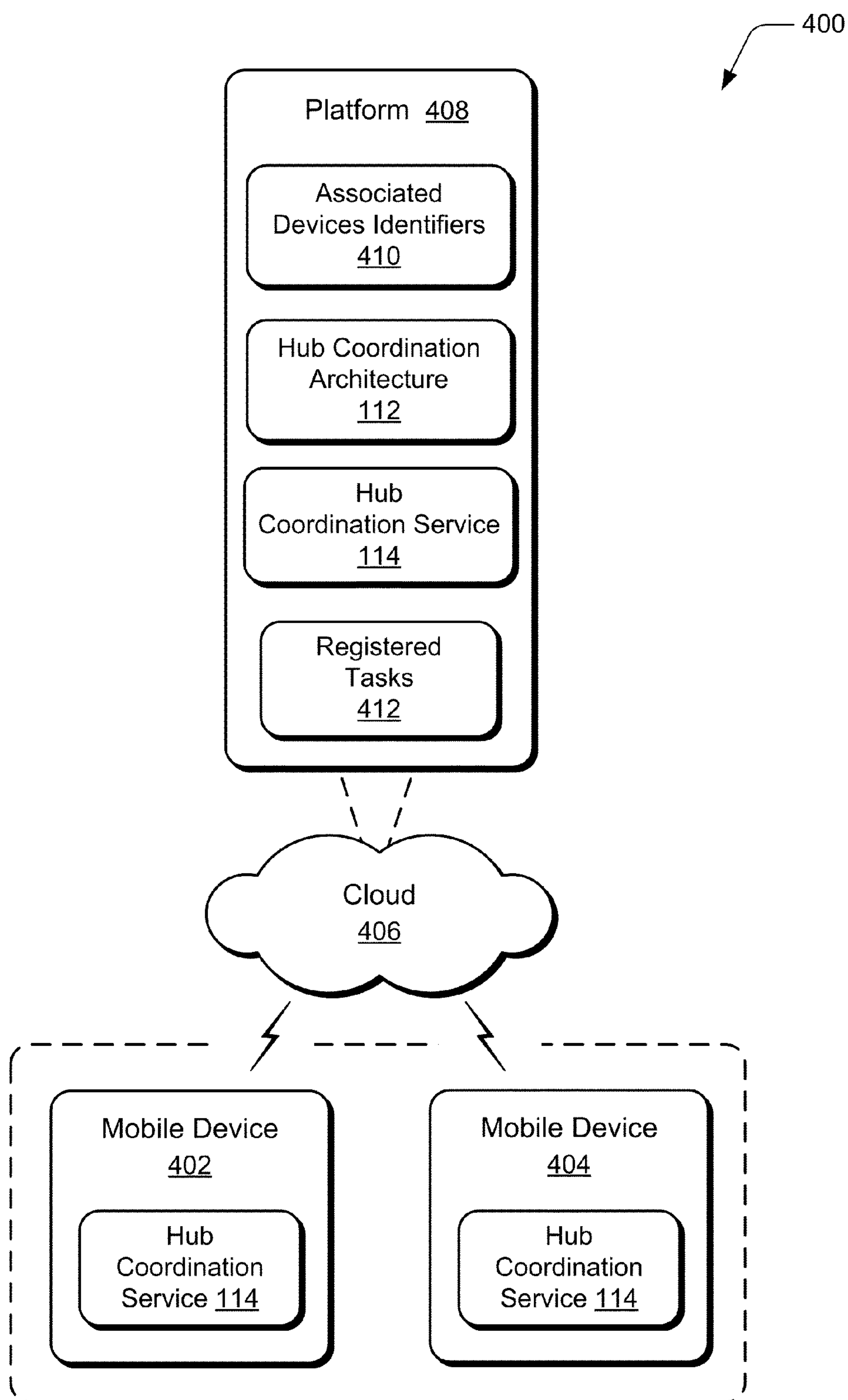
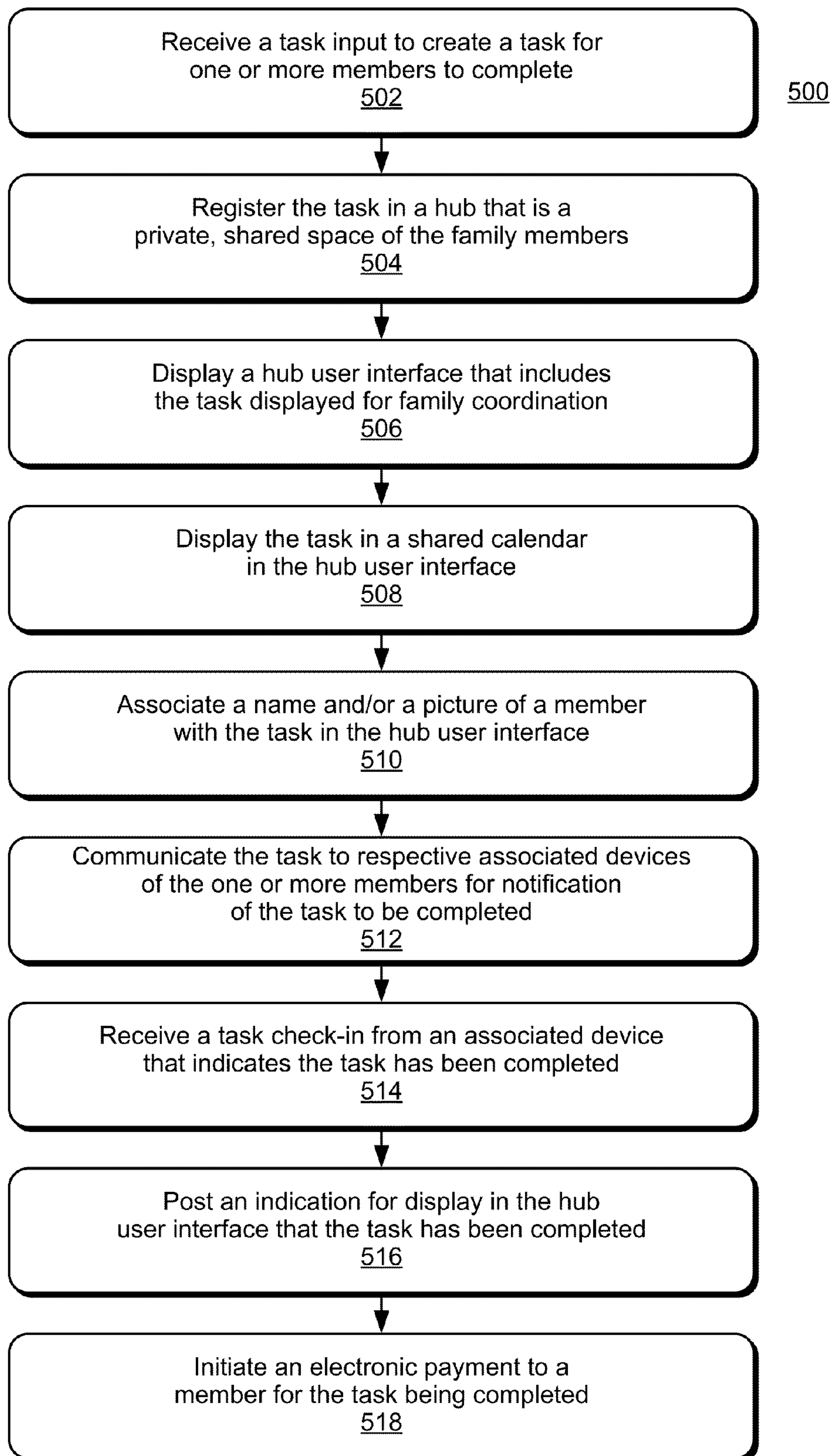
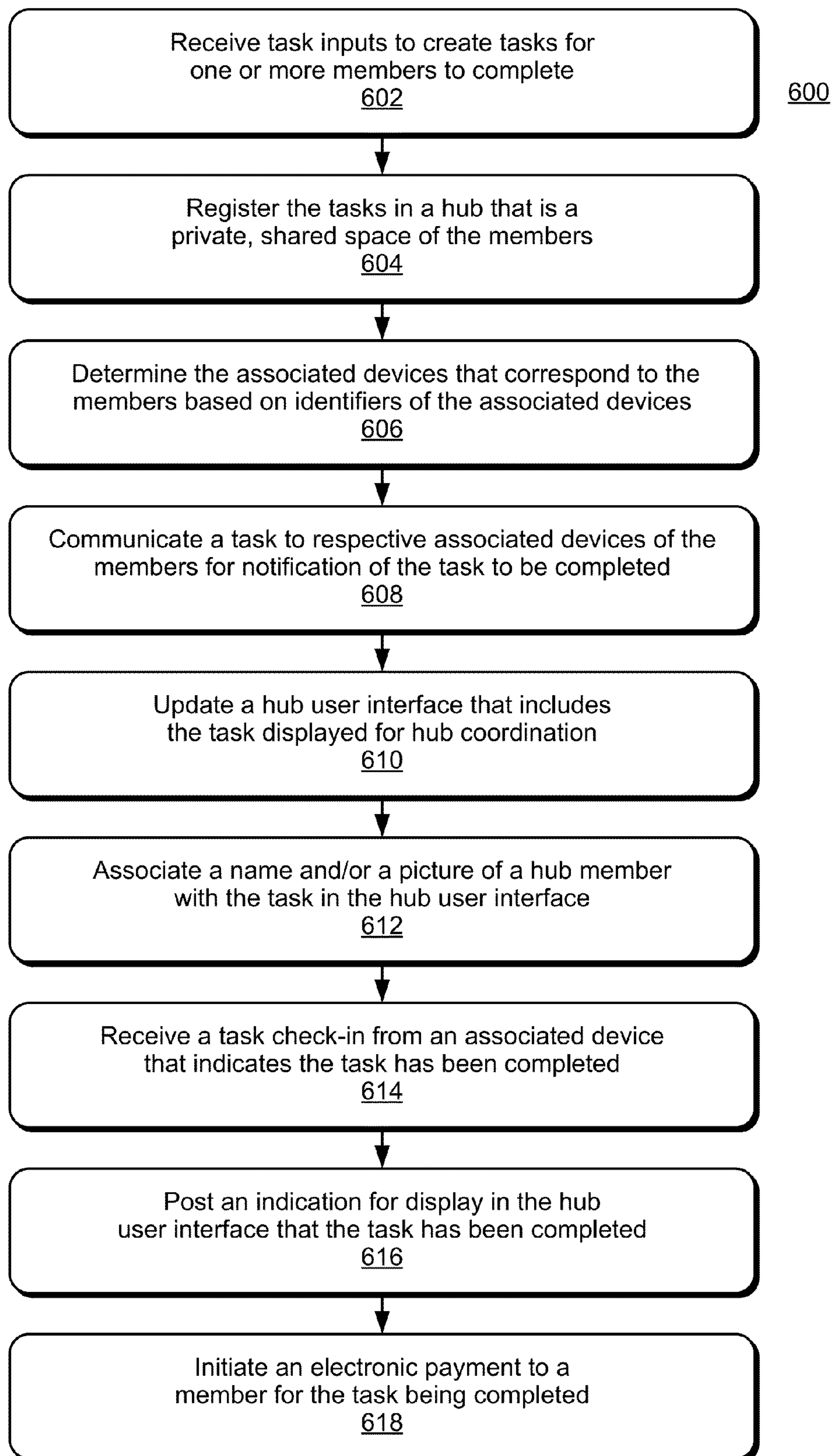


FIG. 3

**FIG. 4**

**FIG. 5**

**FIG. 6**

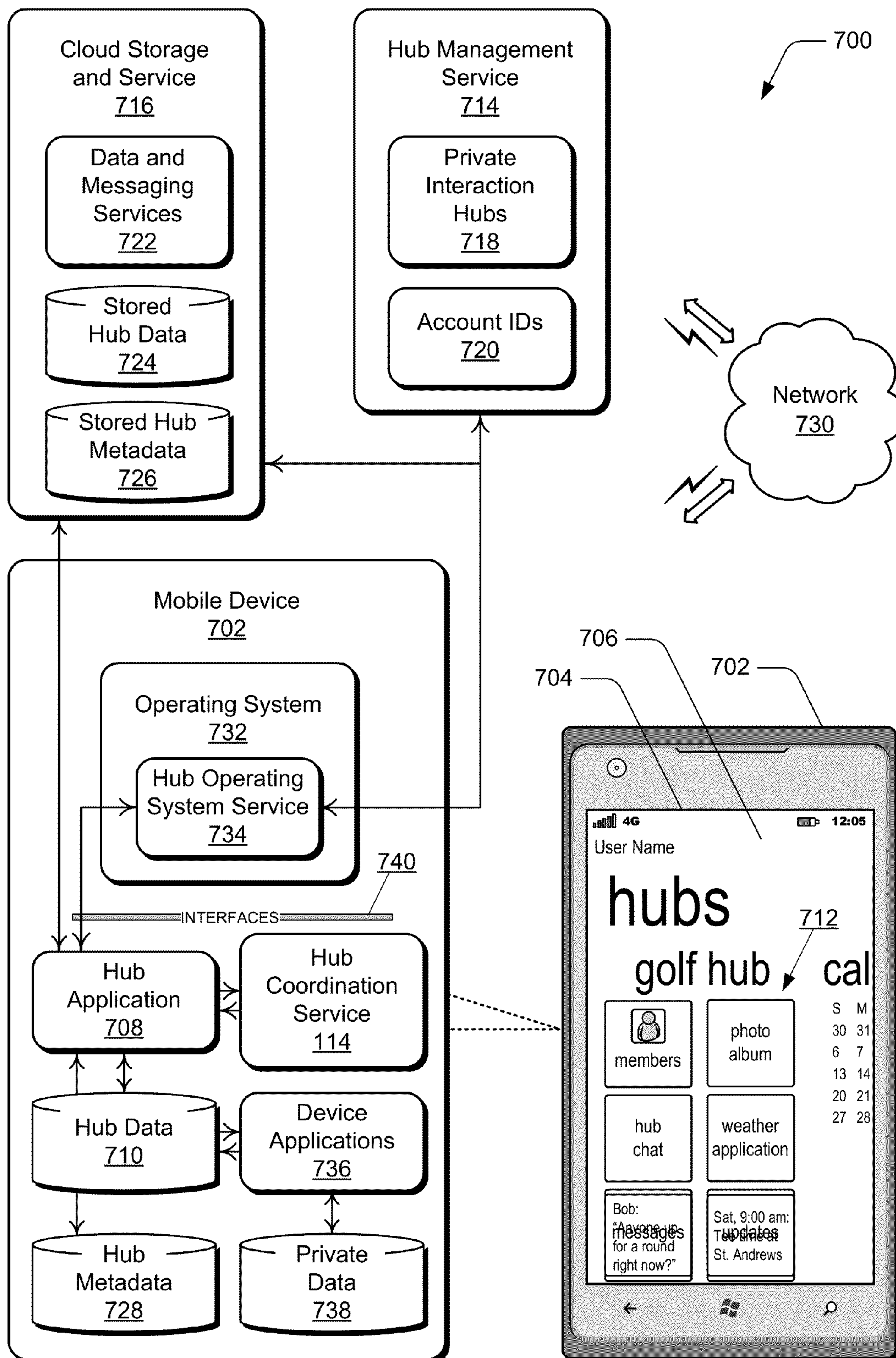


FIG. 7

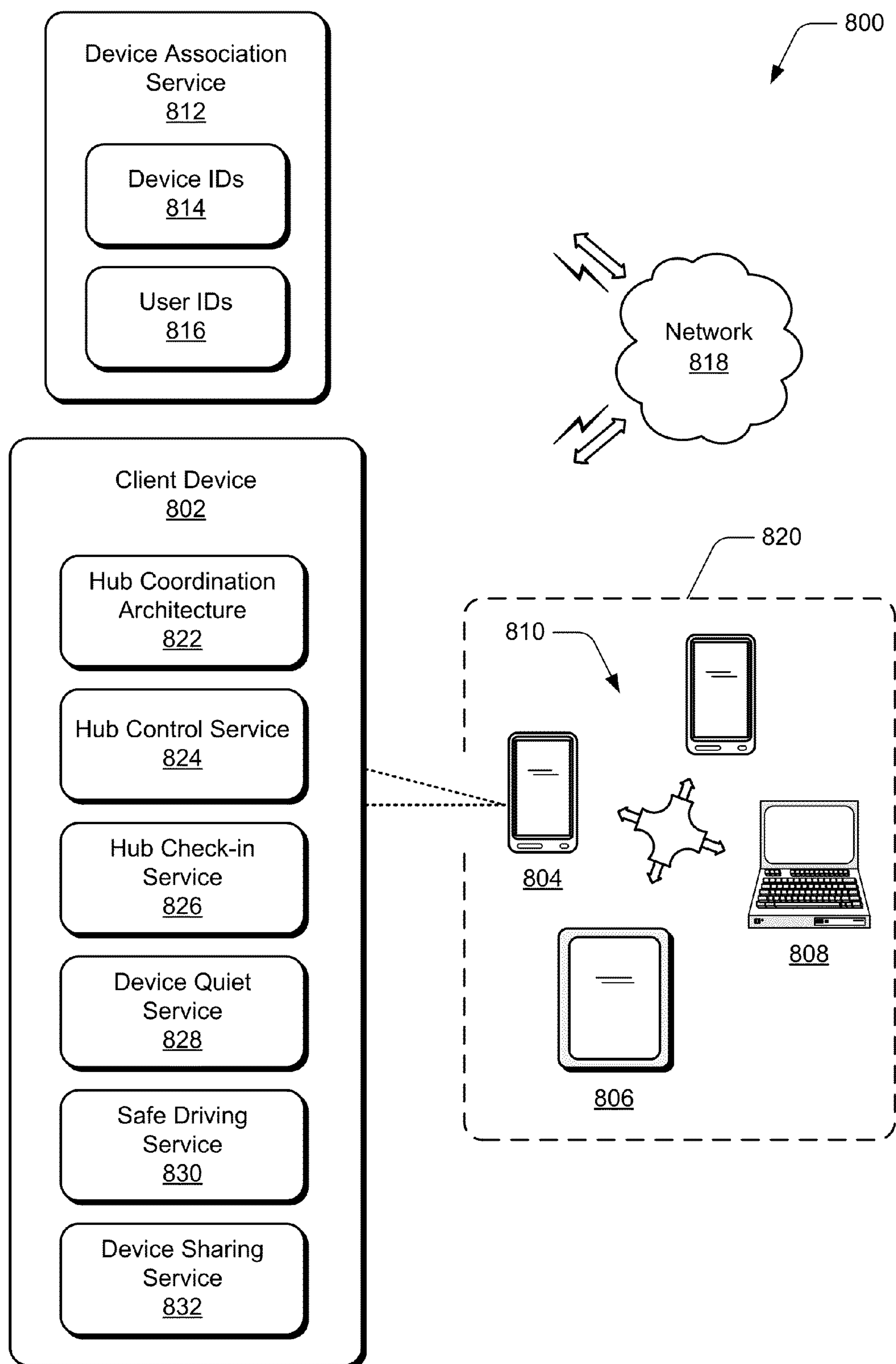
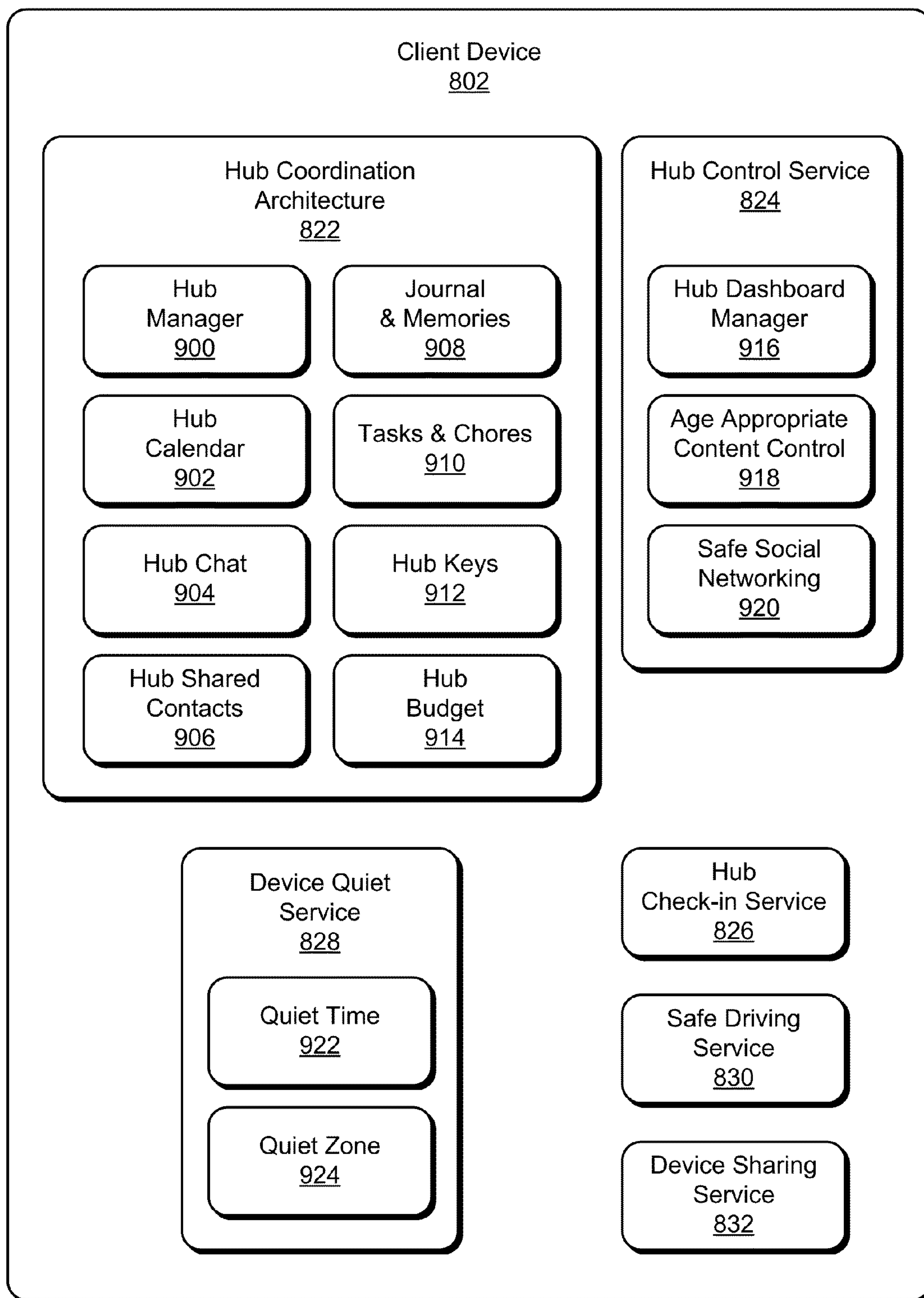


FIG. 8

*FIG. 9*

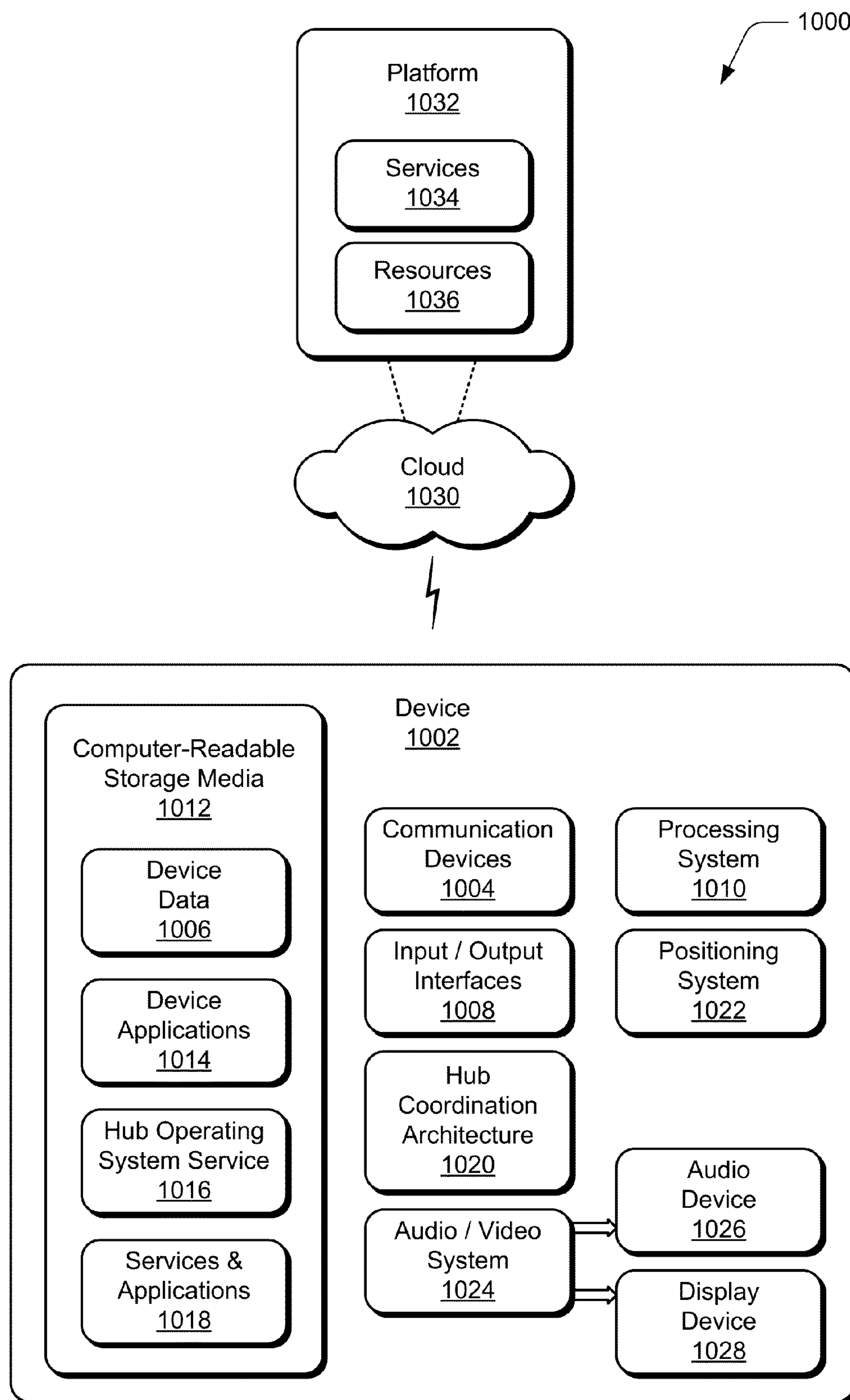


FIG. 10

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HUB COORDINATION SERVICE

RELATED APPLICATION

This application claims priority under 35 U.S.C. Section 119(e) to U.S. Provisional Application Ser. No. 61/580,143 filed Dec. 23, 2011 entitled "Mobile Devices Family Coordination", the disclosure of which is incorporated by reference herein in its entirety.

BACKGROUND

Many types of devices, such as mobile phones, tablet devices, and other computing, communication, and entertainment devices increasingly offer more functions, applications, and features which are beneficial to a user, and can enhance one's personal time as well as work and social activities. For example, children can let their parents know by text message or with a phone call from a mobile phone their whereabouts or that they have safely arrived at a particular destination. Additionally, users may contact a variety of different people using a variety of different techniques, such as phone calls, email, instant messages, status updates, share pictures, and so on. Accordingly, it may be difficult using conventional techniques to coordinate actions by users of the different devices.

SUMMARY

This Summary introduces features and concepts of hub coordination service and coordinated tasks, and the concepts are further described below in the Detailed Description and/or shown in the Figures. This Summary should not be considered to describe essential features of the claimed subject matter, nor used to determine or limit the scope of the claimed subject matter.

In embodiments, a device includes a communication interface for communication coordination with one or more associated devices of the device, and the associated devices correspond to hub members. A hub manager is implemented to receive a task input to create a task for one or more of the hub members to complete. The hub manager can register the task in a hub that is a private, shared space of the hub members, and then initiate communication of the task to respective associated devices of the one or more hub members for notification of the task to be completed.

In embodiments, the device includes an integrated display device on which a hub user interface is displayed. The hub user interface includes the task displayed for hub coordination, and the hub user interface is displayable on the associated devices that correspond to the hub members. The task can be displayed in a shared calendar in the hub user interface, and a name and/or a picture of a hub member can be associated with the task in the hub user interface. Any of the hub members may have more than one device from which the hub features and information can be accessed. The hub manager can receive a task check-in from an associated device, where the task check-in indicates that the task has been completed, and then post an indication for display in the hub user interface that the task has been completed. The hub manager can also be integrated with an electronic wallet system and initiate an electronic payment to a hub member for the task being completed.

In other embodiments, a hub system includes a network service (e.g., a network of one or more server devices) that executes computer instructions as a hub manager. The hub manager is implemented to receive task inputs from associated devices that correspond to hub members, where a task

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input can be initiated to create a task for one or more of the hub members to complete. The hub manager can register the task in a hub that is a private, shared space of the hub members. The hub manager can then determine the associated devices that correspond to the hub members based on identifiers of the associated devices, and communicate the task to respective associated devices of the hub members for notification of the task to be completed.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of a hub coordination service for coordinated tasks are described with reference to the following Figures. The same numbers may be used throughout to reference like features and components that are shown in the Figures:

FIG. 1 illustrates an example system in which embodiments of a hub coordination service can be implemented;

FIG. 2 is an example of a system showing two different examples of hubs for a family;

FIG. 3 depicts a system showing a hub coordination service of FIG. 1 in greater detail;

FIG. 4 illustrates an example system that includes mobile devices that are examples of the client device as described with reference to the previous FIGS. 1-3;

FIG. 5 illustrates example techniques of a hub coordination service in accordance with one or more embodiments;

FIG. 6 illustrates example techniques of a hub coordination service in accordance with one or more embodiments;

FIG. 7 illustrates an example system in which embodiments of hubs can be implemented;

FIG. 8 illustrates another example system in which various embodiments of the previously described techniques can be implemented;

FIG. 9 further illustrates the various client device services that are described with reference to the previous sections; and

FIG. 10 illustrates an example system that includes an example device, which can implement embodiments of private interaction hubs.

DETAILED DESCRIPTION

Overview

Coordinated task techniques are described. In one or more example, techniques involving a private interaction hub (or simply a "hub") are described that support communication between members of the hub to share content. A hub, for instance, may be specified for a family and thus family members may join the hub to share content, such as messages, photos, and so on. A variety of other hubs may also be configured, such as for employees, friends, and so on. Thus, sharing of content may be performed to members of the hub as a whole instead of involving individual communications are previously required using conventional techniques.

The hub may be utilized to support a wide variety of functionality. One example of this functionality is to coordinate tasks and other usage to be performed by different users of different mobile devices. For example, the hub may be utilized to support a hub calendar, hub chat, hub shared contacts, a hub journal, hub photos and videos, tasks a chores, hub keys, a hub budget, and so on. Further discussion of these and other techniques may be found in relation to the following sections.

While features and concepts of a hub coordination service for coordinated tasks can be implemented in any number of different devices, systems, networks, environments, and/or

configurations, embodiments of a hub coordination service are described in the context of the following example devices, systems, and methods.

Example Environment

FIG. 1 illustrates an example environment 100 in which various embodiments of a hub coordination service can be implemented. The example system includes a client device 102 communicatively coupled to another client device 104 via a network. The client devices 102, 104 may be configured according to a variety of different computing device configurations. In the illustrated example, the client device 102 is configured as a mobile device, such as a mobile phone 104 although other mobile device configurations are also contemplated, such as a tablet device, communication device, convertible device, entertainment, gaming, navigation, and/or other type of portable electronic device. The client devices 102, 104 may also assume a variety of other computing device configurations, such as traditional PCs, laptops, and so on. Although a single instance of the client device 104 is illustrated, this device may be representative of a plurality of different devices and thus reference in the following discussion may be made to client device 104 in single or in plural form. Additional examples of functionality that may be incorporated as part of the client device 102, 104 may be found later in the discussion.

The client devices 102, 104 are illustrated as including respective communication modules 108, 110. The communication modules 108, 110 are representative of functionality of the devices to communicate via the network 106, such as to communicate with each other. The communication modules 108, 110 may perform this communication using a variety of techniques, such as to support voice communication, text messaging (e.g., SMS, MMS), instant messaging, communication via a social network service, email, near-field communications (NFC) and so on. Accordingly, the client device 102, 104 may utilize a variety of different techniques to communicate with each other.

The client device 102 is also illustrated as supporting a hub coordination architecture 112. The hub coordination architecture 112 is representative of functionality to provide a hub that supports communication between members of the hub to share data. The hub, for instance, may include a user interface via which users of the client device 102, 104 may share content based on membership to the hub. Accordingly, the membership may act to support appropriate permissions on content between the users of the hub based on membership to the hub. A variety of different content may be shared via the hub, such as messaging, photos, links, background image of the hub, videos, and so on.

Designated member relationships can be utilized to define how the data and information is managed in relation to the hub, and can be implemented to leverage the social contract embodied in the hub. In embodiments, the hub is implemented by the hub coordination architecture 112 as a user interface and/or a client device application for integration and aggregation of the hub-orientated communications, activities, and information. A hub can be implemented as a private, shared space that is limited to access by defined members of the hub. The hub, for instance, may contain links to other members' profiles, and based on restriction settings, allows aggregation for visibility of some of other members' data and information within the hub, and so on. The hub may also be configured to share a group calendar which can be viewed and edited, a common text message window, a posting board, a shared photo album, a check-in feature, and any other type of shared information as further described as follows and show in relation to FIG. 2.

An example of this functionality is illustrated in FIG. 1 as a hub coordination service 114. The hub coordination service 114 is representative of functionality to coordinate usage of devices and well as tasks to be performed by users of the devices. For example, the hub coordination service 114 may be implemented to maintain a hub calendar, hub chat, hub shared contacts, a hub journal, hub photos and videos, tasks a chores, hub keys, a hub budget, and so on. Further discussion of these and other techniques may be found beginning in relation to FIG. 3.

FIG. 2 is an example of a system 200 showing two different examples of hub user interfaces for a family-orientated hub. The description, layout, orientation, features, and organization of the text, images, photos, graphics, links, data, information, and presentation features shown with reference to the hub user interfaces, as well as with reference to any other user interfaces described herein and/or shown in the figures, are merely examples that may be altered in any aspect for various embodiments and/or implementations of mobile device check-in.

The hub is a central space for membership-orientated coordination of communications, activities, information, and integration. Designated member relationships can be utilized to define how the data and information is managed, and can be implemented to leverage the social contract, such as between members of a defined familial group in the illustrated example. In one or more implementations, the hub is implemented as a user interface (e.g., via a client device application) for integration and aggregation of the membership-orientated communications, activities, and information. A hub can be implemented as a private, shared space between defined members. The hub contains links to other members' profiles, and based on restriction settings, allows aggregation for visibility of some of other members' data and information within the hub. The hub shares a group calendar which can be viewed and edited, a common text message window, a posting board, a shared photo album, a check-in feature, and any other type of shared information.

Devices and/or device accounts can be associated within a set of devices or device accounts (e.g., a family phone account, user accounts, a connected set of devices, and so on), and all or a subset of the devices or accounts can communicate with other devices or accounts. The members of a hub can be defined by any number of different classes of people, such as Junior, Teen, Mom, Dad, (or Parent), Grandparent, Nanny, Life-Coach, and so on for the illustrated example of a family. Further, the members of a family can be defined to distinguish a live-in Nanny from a Babysitter, for example.

Additionally, membership of the hub as well as use of the hub by the members can be controlled by a select collection of users, such as one or two mobile phones by the associated users of the client devices. For example, one of the members in the hub can be the designated control person, such as Mom who runs the household, employer, and so on.

From a single configuration of the members, the hub can be provisioned, setup, and propagated out, e.g., automatically. The features and configuration of a hub may default to an automatic, easy setup, but any rule, feature, or configuration aspect can be readily modified by a user. Provisioning a hub may be based on billing, e.g., a family billing plan. However, if a phone device is changed to a different carrier, for example, the phone device can still receive texts related to the hub. Alternatively or in addition, provisioning a hub can be based on email addresses, phone numbers, user account identifiers, or any other identifier.

A retail person selling a new phone package, for instance, can easily identify the members each to their new phone

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devices and initiate the hub being instantiated. From a consumer perspective, it just works and members can walk out of the store all set up. All of the data and information can be shared with a single selection, and thus the members do not have to share each item (e.g., a grocery list, photos, calendar, etc.) individually and separately.

The hub user interface may act as a shared space that is customizable and provides for user-generated and shared content. Some information can be shared, while other information is not. For example, Mom's complete Christmas list is not viewable by the other family members, but Dad and Kids can add to the list (and only view their contribution). Hub setup may be performed "a la carte," meaning only the features that members want displayed on the hub wall can be selected. For example, Mom wants to see the shopping list, whereas Dad does not shop and so wants to avoid having the list displayed on his device, yet he could still access the shopping list to add items when desired.

The hub user interface integrates functions, calendar functionality, event and/or data summaries (i.e., on the "wall"), as well as content that is shared between the members of the hub (e.g., lists, documents, etc.). For example, the hub user interface may include a "family check-in" or "check-in" option. The hub user interface may also include a chat section where location check-ins messaged are displayed along with other messages interchanged between the members of the hub. The hub "wall" is representative of an area via which members of the group may add to as desired, like a lunchroom bulletin board, family refrigerator, and so on. In implementations, the information can be aggregated in pillars or columns and shown on the hub wall as illustrated. The hub wall can also represent an interrelation between any of the information and data that appears on the wall and its placement in time. The hub settings provide that a user can control which functions are integrated and displayed within the hub, such as on the wall.

The hub information may also be context relevant to the members of the hub, and the calendar includes shared hub events. Calendar updates can be posted as notice events on the wall, and a user can look at the wall to see upcoming hub events, or the events that pertain to one or more other members of the hub. Messaging may also be performed that is private among the members of the hub. A member can instant text (or other communication) to all other members in the hub. Texting—such as for a work meeting—can divide each members' display on their respective devices into individual screens for each member.

The hub may also be extensible, and may link to a hard drive on a home computer, or sync to just one of the other devices, the manager, or cloud control (e.g., from a network-based service). The hub may also be extensible to third parties that add a note on the hub wall, such as implemented with application program interfaces (APIs) for functions to post data to the hub. A third-party application, however, would not have access to the context of the hub wall, such as to obtain or display hub data. The private information and hub data could be encrypted and only decrypted by the phone devices that are associated with the hub.

Thus, the hub supported by the hub coordination architecture 112 may be thought of as a central space coordination of communications, activities, information, and integration of members of the hub. Hubs may be defined to support a variety of different membership, such as for family members, coworkers, friends, acquaintances, fan clubs, and so forth. Therefore, although examples are discussed that relate to a family in the following discussion it should be readily apparent that membership in the hub may be defined in a variety of

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other ways without departing from the spirit and scope thereof. Accordingly, the hub coordination architecture 112 may be used to support a variety of different functionality. An example of this functionality is illustrated as a hub coordination service 114 as further described below and shown in relation to the corresponding figure.

FIG. 3 depicts a system 300 showing the hub coordination service 114 in greater detail. As previously described, the hub coordination service 114 may be implemented to support a variety of functionality. Examples of this functionality are illustrated as being implemented by respective sub-modules in the system and discussed in relation to the corresponding sections.

Hub Calendar 302

A hub calendar 302 is visible on the hub wall and shared by each of the hub members to update other members of hub-orientated events and activities, as well as individual hub member appointments. In embodiments, the hub calendar 302 is displayed as part of the hub user interface, and the hub calendar 302 can be implemented as a client device 102 application. Embodiments of a hub calendar 302 include any one or combination of implementation features, such as described herein.

The hub calendar 302 can include any type of icons or identifiers of past and future events, activities, appointments, etc. for any of the hub members in the hub. Information noted on the hub calendar 302 can be context relevant to the members of the hub, and the calendar includes shared hub events. Calendar updates can be posted as notice events on the hub wall, where a hub member can look at the wall to see upcoming hub events, or the events that pertain to one or more other hub members.

Conflicts resolution can be implemented to resolve calendar scheduling conflicts among the hub members. The calendar may be shared with others that are not specifically immediate hub members, such as Grandma or the Nanny who picks up the kids from school. The hub calendar can include action, event, and/or task reminders that are related (e.g., cross-linked) in time. A school calendar can be integrated with the hub calendar, and may be imported information from the kid's school, such as for assignments, events, grades, school calendar events, etc. For example, the hub calendar 302 can import an appointment for a parent-teacher conference from a school calendar, and a parent's mobile phone can then be updated from the hub calendar to indicate the appointment for the parent-teacher conference.

Hub Chat 304

A hub chat feature provides a privatized chat interface for the hub members of the hub within the hub. The hub members can chat individually with one another, or with all of the hub members. In embodiments, the hub chat feature can be implemented as part of the hub user interface, with a client device application.

Hub Shared Contacts 306

A hub shared contacts 306 feature provides a shared phone, address, and/or contact listing for all of the hub members in a hub. In embodiments, the hub shared contacts 306 feature can be implemented as part of the hub user interface, with a client device application. Generally, a person that may correspond to one hub member is the point of contact for the plumber, carpet cleaner, dog walker, and other service people—but when that person is not available, the other hub members typically don't have access or know who to contact. Embodiments of the hub shared contacts feature provide that all of the hub members have access to the hub shared contacts 306, particularly when the usual point of contact hub member is not available.

Hub Journal 308

A hub journal **308** feature provides that any hub member can share any type of material, information, newspaper or magazine subscription, linked reference, television programs, videos, music, etc., and tag the material for the attention of the other hub members within the hub to generate the hub's own journal. In embodiments, the hub journal **308** can be implemented as part of the hub user interface, with a client device application. Embodiments of the hub journal **308** feature include any one or combination of implementation features, such as described herein.

The hub journal **308** can be utilized for subscriptions, such as a hub newspaper subscription, hub content tagging, television programs, videos, magazine articles, music, etc. to create the hub journal. A hub journal **308** includes the concept of a scrapbook or memories (e.g., past events and information), however, the hub journal **308** generally pertains to the present or future collation of material for the hub members. Additionally, each hub member may have his or her own respective journal that the other hub members can access and view.

Hub Memories 310

A hub memories **310** feature provides photos, video, images and the like in a shared private photo album, video library, or music library for the hub members of the hub. Access to a photo album of hub memories **310** can be granted to non-hub members. In embodiments, the hub memories feature can be implemented as part of the hub user interface, with a client device application. Embodiments of the hub memories **310** feature provide that a hub memories journal or photo album can be implemented for the designated hub members, and/or for extended hub members, non-hub members, friends, and the like.

Hub Tasks & Chores 312

A hub tasks and chores **312** feature provides that a hub member can identify and define tasks and/or chores for other hub members to complete. The hub tasks and chores **312** feature can be integrated with other hub features, such as the hub calendar, hub check-in, and eWallet. For example, the completion of tasks and chores can correlate to kids' allowance, or may be used as a hub incentive to reach a milestone that each of the hub members will benefit from, such as a hub vacation, movie night, etc. In embodiments, the hub tasks and chores **312** feature can be implemented as part of the hub user interface, with a client device application. In certain embodiments, the hubs tasks and chores features may allow the chaining and/or coordination of tasks between hub members. For example, when a first hub member completes his task, it may set up a task for a second hub member (for example, based on an input from one of the hub members or a workflow defined by one of the hub members). Alternatively, the task completion by a first hub member may provide an input for a task to be completed by a second hub member.

Hub Keys 314

A hub keys **314** feature provides that a mobile phone or other portable communication device can be implemented to interrelate with an automobile or building, and give a user the ability to grant or restrict access and/or use of the automobile or building to someone either within the hub, or outside of the hub. In embodiments, the hub keys **314** features can be implemented as a user interface with the hub and/or as a client device application. The hub keys **314** feature can also be implemented for interaction with application and on-line content stores (e.g., Windows Store, iTunes, etc.). Embodiments of the hub keys features include any one or combination of implementation features, such as described in the following paragraphs.

Hub keys **314** provides electronic house and/or vehicle keys, and can be implemented with near field communication (NFC) security or other proximity security in a phone device. In embodiments, the phone is the identity that is associated with the electronic key to a house, building, or vehicle. A parent can unlock a car for someone, or unlock the front door of the house for a child coming home from school, for maid access, or for a delivery person. Hub keys **314** can also be used to monitor when a child enters and exits the house. A parent can also easily "change the locks" with the electronic hub keys, and the key codes can be updated on all of the hub members' devices.

The hub keys **314** can be set as variable time locks, such as to limit access to a vehicle after a designated time in the evening. Alternatively, a hub key **314** may be implemented as a portable permission slip to allow a kid access to a vehicle, television, computer, etc. Hub keys **314** can be implemented as an intersection of the house and hub. For example, the television may not display some channels or content when only the kids are home, but will allow the channels and/or content to display when a parent is home (presumably monitored by adult).

Hub keys **314** can also be implemented to provide a kid money on his or her phone with a spending limit and/or a time limit. A parent doesn't have to then transfer money or access cash to give to the kid. This may be incorporated with remote parental approval. Related to hub keys, people care about the safety and security of their families. In eWallet scenarios, a phone user may have fewer authentication checks for accessing a wallet if the user's phone is connected to the home WiFi and GPS shows that the user is located at the home. The user's phone may also manage a child's allowance. In terms of NFC, if a home's front door is NFC-enabled, a user can grant access to the housecleaning service and get notified when they attempt access or even require a response from my phone to "bu10 them in". This can also be used to limit access within the house once a service provider has entered.

Hub Budget 316

A hub budget **316** feature provides that a hub member in a hub can allocate electronic funds to any of the other hub members, or to non-hub members. The hub budget **316** feature can also link with third-party applications to purchase and distribute such things as tickets and gift cards to any of the other hub members in the hub. The hub budget **316** may be implemented in conjunction with an eWallet application, and can be implemented for vacation shopping, pre-paid passes, gift cards, and to keep track of electronic receipts. In embodiments, the hub budget feature can be implemented as part of the hub user interface, with a client device application.

FIG. 4 illustrates an example system **400** that includes mobile devices **402** and **404** that are examples of the client device **102** as described with reference to the previous FIGS. 1-3. In embodiments, the mobile devices **402** and **404** can each be associated with a different user, and the users are defined members of the hub illustrated through use of a dashed line, which may include two or more associated devices. The mobile devices each include an implementation of the hub coordination architecture **112** and hub coordination service **114** as described with reference to the previous FIGS. 1-3 to manage and coordinate tasks. In the example system **400**, multiple devices can be interconnected through a central computing device or system, which may be local to the multiple devices or may be located remotely from the multiple devices.

In embodiments, the central computing device may be a cloud **406** of one or more server computers that are connected to the multiple devices through a network, the Internet, or

other data communication link. In embodiments, this inter-connection architecture enables functionality across multiple devices to provide a networked service environment of the multiple devices. Each of the devices may have different physical configurations and capabilities, and the central computing device can utilize a platform **408** to maintain the associated devices identifiers **410**, and implement the hub coordination architecture **112** along with the hub coordination service **114** in embodiments of a hub coordination service.

The cloud **406** includes and/or is representative of the platform **408** for the networked service components (e.g., the hub coordination service **114**) that implements embodiments of a hub coordination service. The platform **408** abstracts underlying functionality of hardware, such as server devices, and/or software resources of the cloud. The networked service components may include applications and/or data that can be utilized while computer processing is executed on servers that are remote from the mobile devices **402** and **404**.

In embodiments, the hub coordination service **114** at the platform **408** is implemented to receive task inputs from associated devices (e.g., the mobile devices **402** and **404**) that correspond to hub members, where a task input can be initiated to create a task for one or more of the hub members to complete. The hub coordination service **114** can register the tasks **412** in the hub that is the private, shared space of the members of the hub. The hub coordination service **114** can then determine the associated devices that correspond to the members based on the associated devices identifiers **410**, and communicate the task **412** to respective associated devices of the members for notification of the task to be completed. The hub coordination service **114** at the platform **408** can also implement any of the embodiments and features of a hub coordination service as described herein.

Example Procedures

The following discussion describes coordination techniques that may be implemented utilizing the previously described systems and devices. Aspects of each of the procedures may be implemented in hardware, firmware, or software, or a combination thereof. The procedures are shown as a set of blocks that specify operations performed by one or more devices and are not necessarily limited to the orders shown for performing the operations by the respective blocks. In portions of the following discussion, reference will be made to FIGS. 1-4.

Example techniques **500** and **600** are described with reference to respective FIGS. 5 and 6 in accordance with one or more embodiments of coordinated tasks via mobile devices. Generally, any of the services, components, modules, methods, and operations described herein can be implemented using software, firmware, hardware (e.g., fixed logic circuitry), manual processing, or any combination thereof. Example methods may be described in the general context of executable instructions stored on computer-readable storage media that is local and/or remote to a computer processing system, and implementations can include software applications, programs, functions, and the like.

FIG. 5 illustrates example technique **500** of a hub coordination service. The order in which the technique blocks are described are not intended to be construed as a limitation, and any number of the described technique blocks can be combined in any order to implement a technique, or an alternate technique.

At block **502**, a task input is received to create a task for one or more hub members to complete. For example, the hub coordination service **114** implemented at the mobile device receives task inputs to create tasks for one or more hub members to complete. The task inputs can be received as user

inputs to the device and/or as user inputs to associated devices that correspond the hub members.

At block **504**, the task is registered in a hub that is a private, shared space of the hub members. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 registers the tasks in the hub. Similarly, the hub coordination service **114** at the client device **102** registers tasks in the hub for access by the hub members.

At block **506**, a hub user interface is displayed that includes the task displayed for hub coordination. For example, the mobile device of FIG. 4 includes the integrated display device **402** on which the user interface **404** is displayed, such as the hub user interface that includes tasks displayed for hub coordination. The hub user interface is displayable on the associated devices that correspond to the hub members. Similarly, the various client devices (for example, **102**, **104**, **402**, **404**) each include an integrated display device to display a hub user interface that may include displayed tasks.

At block **508**, the task is displayed in a shared calendar in the hub user interface. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 initiates displaying the tasks for the hub members in the shared calendar in the hub user interface. At block **510**, an identifier (for example, a name and/or a picture) of a hub member is associated with the task in the hub user interface. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 associates a name and/or a picture of a hub member with a task in the hub user interface. Similarly, the hub coordination service **114** at the client device **102** initiates displaying tasks for hub members that correspond to the associated devices **110** in a hub user interface, and names and/or pictures of the hub members are associated with the tasks.

At block **512**, the task is communicated to respective associated devices of the one or more hub members for notification of the task to be completed. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 initiates communication of the tasks to be completed to the respective associated devices of the hub members. Similarly, the hub coordination service **114** at the client device **102** initiates communication of the tasks to be completed by the associated devices **104** for the corresponding hub members.

At block **514**, a task check-in is received from an associated device that indicates the task has been completed. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 receives a task check-in from an associated device that indicates a task has been completed. At block **516**, an indication is posted for display in the hub user interface that the task has been completed. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 initiates displaying that the task has been completed, such as displayed in the hub user interface and/or in the shared calendar.

At block **518**, an electronic payment is initiated to a hub member for the task being completed. For example, the hub coordination service **114** implemented at the mobile device of FIG. 4 is integrated with an electronic wallet system and initiates an electronic payment to a hub member for the task being completed. Similarly, the hub coordination service **114** at the client device **102** receives a task check-in from an associated device **104** that indicates a task has been completed, initiates displaying that the task has been completed, and/or initiates an electronic payment to a hub member for the task being completed.

FIG. 6 illustrates example technique **600** of a hub coordination service. The order in which the technique blocks are described are not intended to be construed as a limitation, and

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any number of the described technique blocks can be combined in any order to implement a technique, or an alternate technique.

At block 602, task inputs are received to create tasks for one or more hub members to complete. For example, the hub coordination service 114 implemented as part of the platform 408 (FIG. 4) receives the task inputs from any of the associated devices (e.g., the mobile devices 402 and 404) that correspond to hub members. At block 604, the tasks are registered in a hub that is a private, shared space of the hub members. For example, the hub coordination service 114 at the platform 408 registers the tasks in the hub.

At block 606, the associated devices that correspond to the hub members are determined based on identifiers of the associated devices. For example, the hub coordination service 114 at the platform 408 determines the associated devices, such as the mobile devices 402 and 404, based on the associated devices identifiers 114. At block 408, the tasks are communicated to respective associated devices of the hub members for notification of the task to be completed. For example, the hub coordination service 114 at the platform 408 communicates the tasks to the associated devices 402 and 404 for hub member notification of the tasks to be completed.

At block 610, a hub user interface is updated to include the task for hub coordination. For example, the hub coordination service 114 at the platform 408 updates the hub user interface to include the tasks for hub coordination. The tasks can be added to the shared calendar in the hub user interface, which is displayable on the associated devices that correspond to the hub members. At block 612, a name and/or a picture of a hub member is associated with the task in the hub user interface. For example, the hub coordination service 114 at the platform 408 associates a name and/or picture of a hub member with a task that is displayed in the hub user interface and/or in the shared calendar.

At block 614, a task check-in is received from an associated device that indicates the task has been completed. For example, the hub coordination service 114 at the platform 608 receives a task check-in from an associated device (e.g., the mobile devices 402 and 404), where the task check-in indicates that a task has been completed. At block 616, an indication is posted in the hub user interface of the task having been completed. For example, the hub coordination service 114 at the platform 408 posts an indication in the hub user interface of the task having been completed. At block 618, an electronic payment is initiated to a hub member for the task being completed. For example, the hub coordination service 114 at the platform 608 can be integrated with an electronic wallet system, and initiates an electronic payment to a hub member for the task being completed.

Implementation Example

FIG. 7 illustrates an example system 700 in which embodiments of private interaction hubs can be implemented. The system 700 includes an example mobile device 702, which may be any one or combination of a wired or wireless device, such as a mobile phone, tablet, computing, communication, entertainment, gaming, media playback, and/or other type of device. Any of the devices can be implemented with various components, such as a processing system and memory, as well as any number and combination of differing components as further described with reference to the example device shown in FIG. 10. As such, the mobile device 702 may implement techniques previously described in whole in or part, such as the techniques described with reference to the hub coordination service 114.

The mobile device 702 includes an integrated display device 704 on which user interfaces can be displayed, such as

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a hub user interface 706 of a hub application 708. The hub user interface offers a unified interactive view of the hub data 710 for a single, private interaction hub and the hub application 708 aggregates disparate types of the hub data 710 originating from the various member users of the private interaction hub. For example, the hub user interface may provide a single unified access point to shared hub messages, status updates, check-ins, hub calendar events, hub media, hub applications, and other types of hub content. As described above, a private interaction hub (or simply “hub”) is a private network or association of member users who voluntarily elect to privately interact and collaborate with each other in a bi-directional manner. The hub data 710 includes any shared data or metadata that is used to facilitate the interaction and collaboration between the members of a private interaction hub, and may include shared data for messaging, notes, contact management, documents, tasks, location updates, photos, calendar events, applications (to include collaborative gaming applications), and/or other media content, such as any type of audio, music, video, and/or image data that may be available or accessed from any source.

The basic functionality of an example private interaction hub is shown as a golf hub displayed in the hub user interface 706 of the hub application 708. For example, the hub user interface can include various selectable user interface tiles 712, such as a members tile that is selectable to initiate a display of the constituent members of the private interaction hub. The user interface tiles 712 may also include hub chat and/or messages tiles to allow a hub member to participate in shared messaging threads with the other member users of the hub. For example, as shown, the member “Bob” has asked “Anyone up for a round right now?” The user interface tiles 712 may also include a photo album tile that is selectable to view photos shared by any of the hub members with the hub, and a shared notebook tile from which the hub members can view shared notes. For example, the golf hub may include a shared notes document that compiles the hub members’ collective research of new golf equipment. The hub user interface 706 may also display a shared calendar that allows a member of the hub to view, edit, and post calendar events that will be shared with all of the other hub members. For example, the calendar tile shows an upcoming tee time at St. Andrews on Saturday at 9:00 a.m. for all of the members. When a user selects a group item (e.g., the message from Bob) or tile (e.g., the messaging tile), further details about the selected item or group items related to the selected tile may be displayed by the hub application itself or the hub application may call a different device application 736 (e.g., a messaging application) to display further details about the item(s).

When a user selects or otherwise engages with a piece of displayed hub data, such as the golf message from Bob, the hub application may provide additional details or options to the user to permit the user to interact further with the hub data. For example, the hub application may display controls to allow the user to edit or reply to Bob’s message. Alternatively or in addition, when a user selects or otherwise engages with a piece of displayed hub data (e.g., Bob’s message), the hub application may launch or call another device application to permit the user to further interact with the piece of hub data (e.g., the hub application may call a native messaging application).

The hub user interface 706 of the hub application 708 can also include user-selectable access to third-party applications, such as when an application is “pinned” to, or otherwise shared with a private interaction hub. A pinned third-party application may also utilize the shared hub data, such as shared application preferences or shared application state

data. For example, the golf hub shown displayed in the hub user interface **706** includes a live tile representing a third-party weather application that the members of the hub can quickly access to check the weather forecast at their local golf club, such as when planning an upcoming golf outing. A user of the mobile device **702** can also customize display aspects of a hub user interface, such as the content of the user interface and how the elements of the hub user interface are arranged. Another example of a hub user interface of the hub application **708** is a panoramic hub user interface, such as for a family-centric private interaction hub as shown and described in greater detail with reference to FIG. 2.

The example system **700** also includes a hub management service **714**, and a cloud storage and service **716**. The hub management service **714** manages the formation and maintenance of private interaction hubs **718**. The hub management service can correlate or associate member users of a hub by associating account identifiers **720** of the members with one or more of the private interaction hubs. The account identifier **720** of a member user may be associated with an identifier of a private interaction hub **718** in a data table that the hub management service maintains to correlate the hub members with one or more of the private interaction hubs. The hub management service **714** may also associate devices that correspond to hub members based on device identifiers. The account identifiers **720** can include user membership identifiers and/or sign-on credentials, such as an email and password combination, or a username and password combination. The sign-on credentials may be single sign-on (“SSO”) credentials that are utilized for authentication purposes at a number of Web services, including the cloud storage and service **716**.

The cloud storage and service **716** can include any type of cloud-based (e.g., network-based) data and messaging services **722**. The messaging services may include any type of email, text (e.g., SMS, MMS), and/or instant messaging services. The data services may include any type of calendar, photo album, file or document sharing, location, mapping, music sharing, video sharing, gaming, contacts management, and/or notebook services, as well as any other type of services that can be used to share stored hub data **724**. The stored hub data can include any form of messages, updates, events, content, media, and information that is maintained for the private interaction hubs **718**, and is accessible from the mobile device **702**, either upon a request from a device and/or upon a data “push” to the device. The cloud storage and service **716** also maintains stored hub metadata **726** that includes settings and information pertaining to the private interaction hubs **718**, such as the name of a hub, the background image or photo of the hub, and an association of the hub members.

Although shown together as data and messaging services **722**, various application data services and various messaging services may be operated on separate devices and/or operated by separate, distinct entities. Additionally, although the hub management service **714** and the cloud storage and service **716** are shown as independent services, they may be implemented together as a single service. Further, a server device (or group of server devices) can include implementations of both the hub management service **714** and the cloud storage and service **716**, representative of a single entity that may be the same server system, company system, domain, and the like.

The cloud storage and service **716**, and its constituent data and messaging services **722**, interchange the stored hub data **724** and the stored hub metadata **726** between the mobile devices that are associated with member users of a private interaction hub **718**. For example, a data and/or messaging

service of the cloud storage and service **716** can receive a copy of hub data **710** and/or hub metadata **728** from the mobile device **702** that is used by a hub member, store this hub data and hub metadata in the cloud storage as the respective stored hub data **724** and stored hub metadata **726**, and then distribute the stored hub data and stored hub metadata to other mobile devices associated with other member users of the same private interaction hub, as well as to other mobile devices associated with the same hub member. The stored hub metadata **726** can include membership information pertaining to the member users of a private interaction hub, hub identifiers that correlate a piece of hub data to a particular private interaction hub, user identifiers that correlate a piece of hub data to a particular member user, modification dates, and/or other metadata.

The cloud storage and service **716**, and its constituent data and messaging services **722**, may utilize single sign-on (“SSO”) credentials for authentication purposes to limit the dissemination of the stored hub data **724** and the stored hub metadata **726** to only the authorized devices of hub members. Additionally, any of the devices and services (e.g., implemented as server devices) described herein can communicate via a network **730**, which can be implemented to include a wired and/or a wireless network. The network can also be implemented using any type of network topology and/or communication protocol, and can be represented or otherwise implemented as a combination of two or more networks, to include IP-based networks and/or the Internet. The network may also include mobile operator networks that are managed by a mobile network operator and/or other network operators, such as a communication service provider, mobile phone provider, and/or Internet service provider. Alternatively or in addition, peer-to-peer communication techniques may be utilized, such as multiple devices connected using a peer-to-peer communication network.

The mobile device **702** includes an operating system **732** of the device, and the operating system includes a hub operating system service **734** that is implemented to integrate cloud-based services, a hub application **708**, and local device applications **736** with the operating system to implement aspects of the private interaction hubs **718**. The aspects that may be implemented include hub formation and membership maintenance, synchronizing the hub data **710** on the mobile device with the stored hub data **724**, and the hub metadata **728** with the stored hub metadata **726**, with the cloud storage and service **716**, and providing the hub application **708** and the local device applications **736** on the mobile device **702** with access to the hub data **710** and the hub metadata **728**. For example, the hub operating system service **734** may directly access the stored hub metadata **726** at the cloud storage and service **716**.

The hub operating system service **734** (or alternatively, the hub application **708**) may also determine and maintain a local copy of the membership associations of member users account identifiers **720** and identifiers of the private interaction hubs. The hub operating system service **734** may also synchronize the stored hub data **724** from the cloud storage and service **716** with the hub data **710** at the mobile device **702**, and synchronize the stored hub metadata **726** from the cloud storage and service with the hub metadata **728** at the mobile device. The hub operating system service **734** may also synchronize with the cloud storage and service **716** (e.g., by sending changes or additions to hub data **710** and hub metadata **728** to the cloud storage and service **716**). Such data synchronizations may occur in response to a user launching the hub application.

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The mobile device **702** includes the device applications **736** that permit a user of the mobile device to access, create, and/or modify the hub data **710**, private data **738** of the user, as well as the stored hub data **724** that is managed by any of the data and messaging services **722** at the cloud storage and service **716**. Some or all of the device applications **736** may be implemented as client-side components or modules of any of the data and messaging services **722**, or may be implemented as standalone, native applications (e.g., local device applications) at the mobile device. The device applications **736** typically each consume and provide access to only a portion or subset of the hub data **710** and the private data **738**, such as only a single type of hub data and private data (e.g., only messaging data, but not calendar data). The device applications also typically present the consumed hub data to a user in conjunction with the private data **738**. Private data is data or metadata that is not associated with a private interaction hub and that has not been shared with other members of the hub (e.g., data that has not been shared via the cloud storage and service **716**).

The device applications **736** at the mobile device **702** may include a native or third-party messaging application that provides a user with messaging alerts and access to messaging threads. The messaging application provides access to both shared message threads shared with a private interaction hub and private message threads between a user of the mobile device and others who are not members of the hub. The messaging application also allows a user to send a message to all of the hub members without accessing a hub user interface of the hub application. The messaging application may not provide user access to other types of the hub data **710**, other than the hub messages. For example, the messaging application may not provide access to the shared calendar events or shared photo albums of the hub.

The device applications **736** may also include a native or third-party calendaring application that provides scheduling alerts and access to a visual calendar. The calendaring application provides user access to both shared calendar events that are shared with hub members, and private calendar events (e.g., Exchange calendar events) that have not been shared with other members of the hub. The calendaring application also allows a user to create and/or share a calendar event to all members of the hub without accessing a hub user interface of the hub application. The application may not provide user access to other types of the hub data **710**, other than the hub calendar events. For example, the calendaring application may not provide access to the shared message threads or shared photo albums of the hub.

The device applications **736** may also include a native or third-party media viewing and/or editing application that provides access to photo albums of digital photos or other digital media. The media application provides user access to both shared media files (e.g., photos, videos, and/or music) shared with a private interaction hub, and private media files that have not been shared with other members of the hub. The media application also allows a user to share media files with all members of the hub without accessing a hub user interface of the hub application. The media application may not provide user access to other types of hub data **710**, other than hub media files. For example, the media application may not provide access to the shared message threads or shared calendar events of the hub.

The hub operating system service **734** can expose one or more Application Programming Interfaces (“APIs”), application binary interfaces, and/or other types of interfaces **740** to the hub application **708** and to the device applications **736** on the mobile device **702** to allow these applications to access,

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generate, and/or modify the hub data **710** and/or the hub metadata **728**, as described herein. The hub operating system service **734** can be implemented as an integrated software component or module of the operating system **732**. The hub operating system service can be maintained at the mobile device **702** as executable instructions that are stored on computer-readable storage media, such as any suitable memory device or electronic data storage as described with reference to the example device shown in FIG. **10**. Additionally, the hub operating system service can be executed with a processing system at the mobile device to implement aspects of private interaction hubs.

In embodiments, the hub operating system service **734** can initiate the hub management service **714** to provision a private interaction hub **718**. A user of the mobile device **702** can start a private interaction hub **718** and also invite others to join an existing private interaction hub. For example, the hub user interface **706** of the hub application **708** may provide an existing hub member with the option to add a new member to the hub, and the user may identify the prospective member by providing either a mobile device number, or by selecting an existing contact from one of their social networks or other contacts.

The hub operating system service **734** can receive the request from an existing member user of the device and, in response, the hub operating system service **734** and/or the hub management service **714** communicates an invitation to join the hub as an SMS, MMS, or instant message sent to the prospective member’s mobile device that may include a link to a registration site or other registration instructions. The hub operating system service **734** and/or the hub management service **714** receives (e.g., via a registration website) an acceptance to the invitation to join the private interaction hub that includes at least an account identifier (such as an SSO credential), and associates the new member with the existing hub at the hub management service **714**. Updated membership information, including the new member’s account identifier **720** may also be propagated to other mobile devices of other members in the private interaction hub from the hub management service **714**. When the new member user joins the hub, he or she may be prompted to download and/or install various applications configured to provide access to the stored hub data **724** and the stored hub metadata **726**, such as the hub application **708** and/or the any of the device applications **736**. The hub application **708** may also be the entry point by which a user creates a new hub and/or modifies the membership of an existing hub.

A private interaction hub **718** can be provisioned for any association of people, such as family members, coworkers, friends, neighbors, and any other people that may be associated together in a hub. Additionally, a member user of one private interaction hub may also be a member of multiple hubs, which can be based on a single member sign-on that identifies the member to the hub operating system service **734** and/or to the hub management service **714**. For example, a person may be a member of a family hub that associates members of the person’s family, as well as a member of a neighborhood hub that associates members of the person’s neighborhood, and a golf hub that associates the person’s friends that often golf together.

The integration of the hub application **708** with the operating system **732** of the mobile device provides that a user of the device can view a message or update on the hub user interface **706** and in an application user interface of an application that is associated with the message or the update. For example, a hub calendar is integrated with the calendar application (e.g., a device application **736**) on the mobile device

702, and a calendar update that is displayed in the hub user interface 706 can be selected by the user to initiate the update being displayed in a calendar user interface of the calendar application. Alternatively, the user may view the calendar user interface and select a calendar event that is associated with a private interaction hub to initiate a display of the hub calendar, which includes the calendar event for the members of the hub. As another example, a hub calendar event can be displayed in a hub user interface, and the device calendar application can access and display the hub calendar event along with any private data calendar events that only the user of the device has access to view in a user interface of the device calendar application. The hub application 708 and the device application 736 both acquire the same hub calendar event data (e.g., the same hub data 710 stored on the mobile device). The two different user interfaces (e.g., a hub user interface and a device application user interface) display the same calendar event data.

In another example, the hub messages and chat features are integrated with messaging applications (e.g., the device applications 736) on the mobile device 702, and an email, text, or instant message that is displayed in the hub user interface 706 can be selected by the user of the mobile device 702 to initiate the message being displayed in a messaging application user interface. Alternatively, the user may view a recent message from a member of a private interaction hub in a messaging application user interface, and select the message to initiate a display of the hub messages interface, such as to view the discussion thread associated with the recent message.

In embodiments, the hub operating system service 734 at the mobile device 702 can receive social network updates for the member users of a private interaction hub 718, such as when two or more of the members of a hub are also “friends” on a public social network site, such as (e.g., FACEBOOK®, TWITTER®, or LINKEDIN®). The social network updates can be pulled from a social network site based on the established association of the account identifiers 720 of the hub members of a private interaction hub 718 at the hub management service 714. The hub operating system service 734 can then aggregate the social network updates for a particular hub for display in the hub user interface 706 or on a homepage “live tile” associated with the hub. The hub operating system service 734 at the mobile device 702 can also be implemented to coordinate multi-user interactive updates to an event that is managed in a private interaction hub. For example, several members of a hub may participate in a multi-player interactive game, and each successive interactive update from a member of the hub is initiated by the member at a respective associated mobile device.

FIG. 8 illustrates an example system 800 in which various embodiments of the previously described techniques can be implemented. The example system includes a client device 802, which may be any one or combination of a mobile phone 804, tablet device 806, computing device 808, communication, entertainment, gaming, navigation, and/or other type of portable electronic device as previously described. Any of the client devices 810 can be implemented with various components, such as a processor and/or memory system, as well as any number and combination of differing components as further described with reference to the example device shown in FIG. 10 to implement embodiments of the techniques described herein.

The example system 800 includes a device association service 812 that associates or correlates the client devices 810 by device identifiers 814, user identifiers 816, and/or by any other type of identifiable association. Any of the devices and

services can communicate via a network 818, which can be implemented to include wired and/or wireless networks. The network can also be implemented using any type of network topology and/or communication protocol, and can be represented or otherwise implemented as a combination of two or more networks, to include IP-based networks and/or the Internet. The network may also include mobile operator networks that are managed by mobile operators, such as a communication service provider, cell-phone provider, and/or Internet service provider. A mobile operator can facilitate mobile data and/or voice communication for any type of a wireless device or mobile phone.

The client devices 810 can each be associated with a different user, and the users are defined members of a hub 820. The example client device 802 is representative of the various client devices 810 in the hub. Any of the client devices in the family can include services, such as software applications (e.g., computer-executable instructions), that can be executed by a processor or processor system to implement the embodiments described herein. In this example, the client device 802 includes a hub coordination architecture 822 that implements features of a hub; a hub control service 824 that implements features of a hub dashboard; a hub check-in service 826; a device quiet service 828 that implements features of quiet time and quiet zone; a safe driving service 830; and a device sharing service 832.

Additionally, any one or combination of the various client device services may be abstracted for implementation by a network service provider, such as the device association service 812. For example, the client devices 810 that are associated in the hub 820 can be interconnected through a central computing device or system (e.g., may be one of the client devices 810), which may be local to the multiple devices or may be located remotely from the devices. In embodiments, the central computing device may be a cloud service of one or more server computers that are connected to the multiple devices via the communication network 818 or other communication link. The interconnection architecture enables functionality across multiple devices to provide a common and seamless experience to a user of the multiple devices. Each of the client devices may have different physical configurations and capabilities, and the central computing device implements a platform to enable delivery of an experience that is both tailored to a particular device and yet common to all of the devices.

FIG. 9 further illustrates the various client device services that are described with reference to the previous sections. The client device 902 includes the hub coordination architecture 822, the hub control service 824, the hub check-in service 826, the device quiet service 828, the safe driving service 830, and the device sharing service 832. In embodiments, the hub coordination architecture 822 may generally be implemented as a service, as described herein. Generally, any of the described services may be implemented and/or described in the general context of software, firmware, hardware (e.g., fixed logic circuitry), manual processing, applications, routines, programs, objects, components, data structures, procedures, modules, functions, or any combination thereof. A software implementation represents program code that performs specified tasks when executed by a computer processor. In embodiments, any of the processing, computation, filtering, code execution, etc. can be implemented with distributed computing services and/or devices, such as on a client device, a server device, and/or network-based service.

In this example of the client device services, the hub coordination architecture 822 includes a hub manager 200 that implements, coordinates, and/or manages various hub fea-

tures, such as hub calendar **902**, hub chat **904**, hub shared contacts **906**, hub journal and memories **908**, tasks and chores **910**, hub keys **912**, and hub budget **914**. The hub control service **824** implements features such as a hub dashboard manager **916**, age appropriate content control **918**, and safe social networking **920**. The device quiet service **828** implements features such as quiet time **922** and quiet zone **924**. The various client device services and features are further described throughout the document.

Any of the client device services can include, be integrated with, or implement any of the other client device services and applications. For example, the hub coordination architecture **822** can include any one or combination of the hub control service **824**, the hub check-in service **826**, the device quiet service **828**, the safe driving service **830**, and the device sharing service **832**. In embodiments, the hub coordination architecture **822** may be implemented for the coordination of time, messaging, data, activities, and any other shared services. The shared services may be any of the client device services and/or any type of shared services that may be associated with a service and/or multi-system operator (MSO) devices. Further, the hub control service **824** can be implemented to throttle, expand, manage, and/or reallocate data sharing of the client device services. Any of the hub features and/or applications of the hub coordination architecture can be implemented as private, some private and some public, or private with optional user control to share information and data with public third-party services and applications. Similarly, any of the client device services and applications described herein may be private, public, sharable, user-controllable, and/or any combination thereof.

FIG. **10** illustrates an example system **1000** that includes an example device **1002**, which can implement embodiments of private interaction hubs. The example device **1002** can be implemented as any of the devices, services, and/or servers previously described, such as any type of client or mobile device (e.g., mobile phone, tablet, computing, communication, entertainment, gaming, media playback, and/or other type of device). For example, the mobile device **702**, hub coordination service **114**, and/or cloud service may be implemented as the example device **1002**.

The device **1002** includes communication devices **1004** that enable wired and/or wireless communication of device data **1006**, such as media content and the shared messages, updates, and events data at the device. The media content can include any type of audio, video, and/or image data. The communication devices **1004** can also include transceivers for cellular phone communication and/or for network data communication.

The device **1002** also includes input/output (I/O) interfaces **1008**, such as data network interfaces that provide connection and/or communication links between the device, data networks, and other devices. The I/O interfaces can be used to couple the device to any type of components, peripherals, and/or accessory devices. The I/O interfaces also include data input ports via which any type of data, media content, and/or inputs can be received, such as user inputs to the device, as well as any type of audio, video, and/or image data received from any content and/or data source.

The I/O interfaces **1008** also support natural user interface (NUI) inputs to the device **1002**, such as any interface technology that enables a user to interact with a device in a “natural” manner, free from artificial constraints imposed by input devices such as mice, keyboards, remote controls, and the like. Examples of natural user interface inputs may rely on speech recognition, touch and stylus recognition, gesture recognition on-screen and motion gesture recognition proximate

the device, head, eye, and environment recognition and tracking, augmented reality and virtual reality systems, and any other type of audible, vision, touch, gesture, and/or machine intelligence that may determine user input intentions.

The device **1002** includes a processing system **1010** that may be implemented at least partially in hardware, such as with any type of microprocessors, controllers, and the like that process executable instructions. The processing system can include components of an integrated circuit, programmable logic device, a logic device formed using one or more semiconductors, and other implementations in silicon and/or hardware, such as a processor and memory system implemented as a system-on-chip (SoC). Alternatively or in addition, the device can be implemented with any one or combination of software, hardware, firmware, or fixed logic circuitry that may be implemented with processing and control circuits. The device **1002** may further include any type of a system bus or other data and command transfer system that couples the various components within the device. A system bus can include any one or combination of different bus structures and architectures, as well as control and data lines.

The device **1002** also includes computer-readable storage media **1012**, such as data storage devices that can be accessed by a computing device, and that provide persistent storage of data and executable instructions (e.g., software applications, programs, functions, and the like). Examples of computer-readable storage media include volatile memory and non-volatile memory, fixed and removable media devices, and any suitable memory device or electronic data storage that maintains data for computing device access. The computer-readable storage media can include various implementations of random access memory (RAM), read-only memory (ROM), flash memory, and other types of storage media in various memory device configurations.

Generally, computer-readable storage media is representative of media and/or devices that enable persistent and/or non-transitory storage of data in contrast to mere signal transmission, carrier waves, or signals per se. A computer-readable signal media may refer to a signal-bearing medium that transmits instructions, such as via a network. The signal media can embody computer-readable instructions as data in a modulated data signal, such as carrier waves or other transport mechanism.

The computer-readable storage media **1012** provides storage of the device data **1006** and various device applications **1014**, such as an operating system that is maintained as a software application with the computer-readable storage media and executed by the processing system **1010**. In this example, the device applications also include an hub operating system service **1016** that implements embodiments of private interaction hubs, such as when the example device **1002** is implemented as the client device **702** shown in FIG. **7**. An example of the hub operating system service **1016** is the hub operating system service **724** that is integrated with the operating system **722** at the mobile device **702**, as described with reference to FIG. **7**.

The device applications **1014** can also include any of the hub services and applications **1018** that implement embodiments of private interaction hubs and/or mobile devices family coordination, such as described with reference to FIGS. **7-9**. The example device **1002** also includes a hub coordination architecture **1020**, which may be implemented in the general context of software, firmware, hardware (e.g., fixed logic circuitry), or any combination thereof to support embodiments of private interaction hubs and/or mobile devices family coordination. The device **1002** can also include a positioning system **1022**, such as a GPS transceiver,

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or similar positioning system components, that can be utilized to determine a global or navigational position of the device.

The device **1002** also includes an audio and/or video system **1024** that generates audio data for an audio device **1026** and/or generates display data for a display device **1028**. The audio device and/or the display device include any devices that process, display, and/or otherwise render audio, video, display, and/or image data. In implementations, the audio device and/or the display device are integrated components of the example device **1002**. Alternatively, the audio device and/or the display device are external, peripheral components to the example device.

In embodiments, at least part of the techniques described for private interaction hubs may be implemented in a distributed system, such as over a “cloud” **1030** in a platform **1032**. The cloud **1030** includes and/or is representative of the platform **1032** for services **1034** and/or resources **1036**. For example, the services **1034** may include the hub management service **708** and the cloud service and storage **710** as described with reference to FIG. 7. Additionally, the resources **1036** may include any of the messaging applications and the collaborative applications as described previously.

The platform **1032** abstracts underlying functionality of hardware, such as server devices (e.g., included in the services **1034**) and/or software resources (e.g., included as the resources **1036**), and connects the example device **1002** with other devices, servers, etc. The resources **1036** may also include applications and/or data that can be utilized while computer processing is executed on servers that are remote from the example device **1002**. Additionally, the services **1034** and/or the resources **1036** may facilitate subscriber network services, such as over the Internet, a cellular network, or Wi-Fi network. The platform **1032** may also serve to abstract and scale resources to service a demand for the resources **1036** that are implemented via the platform, such as in an interconnected device embodiment with functionality distributed throughout the system **1000**. For example, the functionality may be implemented in part at the example device **1002** as well as via the platform **1032** that abstracts the functionality of the cloud **1030**.

Although embodiments of a hub coordination service for coordinated tasks have been described in language specific to features and/or methods, the appended claims are not necessarily limited to the specific features or methods described. Rather, the specific features and methods are disclosed as example implementations of a hub coordination service.

The invention claimed is:

1. A device, comprising:

one or more processors;

a communication interface configured for communicating with one or more associated devices of the device, the one or more associated devices corresponding to one or more hub members; and

one or more computer-readable storage memories storing computer-readable instructions which, when executed, perform operations as a hub manager that is configured to:

receive a task input to create a task assigned to one or more of the hub members to complete;

register the task in a hub that is a private, shared space of the hub members;

initiate communication of the task to respective associated devices of the one or more hub members for notification of the task to be completed;

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receive a task check-in from an associated device, the task check-in indicating that the task has been completed by a hub member; and

initiate an electronic payment to the hub member for the task being completed.

2. The device as recited in claim **1**, further comprising an integrated display device configured to display a hub user interface that includes the task displayed for hub coordination, the hub user interface displayable on the one or more associated devices that correspond to the one or more hub members.

3. The device as recited in claim **2**, wherein the hub manager is configured to initiate a display of the task in a shared calendar in the hub user interface.

4. The device as recited in claim **2**, wherein the hub manager is configured to associate at least one of a name and a picture of a hub member with the task in the hub user interface.

5. The device as recited in claim **2**, wherein the hub manager is configured to post an indication for display in the hub user interface that the task has been completed.

6. A method, comprising:

receiving, by a computing device, a task input to create a task assigned to one or more hub members to complete; registering, by the computing device, the task in a hub that is a private, shared space of the hub members;

communicating the task to respective associated devices of the one or more hub members for notification of the task to be completed;

causing display of a hub user interface that includes the task displayed for hub coordination, the hub user interface displayable on one or more associated devices that correspond to the one or more hub members; and

responsive to the task being completed by a hub member, initiating an electronic payment to the hub member for the task being completed.

7. The method as recited in claim **6**, further comprising causing display of the task in a shared calendar in the hub user interface.

8. The method as recited in claim **6**, further comprising associating at least one of a name and a picture of a hub member with the task in the hub user interface.

9. The method as recited in claim **6**, further comprising:

receiving a task check-in from an associated device, the task check-in indicating that the task has been completed; and

posting an indication for display in the hub user interface that the task has been completed.

10. A hub system, comprising:

a network service device to execute computer instructions as a hub manager that is configured to:

receive task inputs from associated devices that correspond to hub members, a task input received from an associated device corresponding to a hub member initiated to create a task assigned to one or more others of the hub members to complete;

register the task in a hub that is a private, shared space of the hub members;

determine the associated devices based on identifiers of the associated devices;

communicate the task to respective associated devices of the one or more hub members for notification of the task to be completed;

receive a task check-in from an associated device, the task check-in indicating that the task has been completed by a hub member; and

initiate an electronic payment to the hub member for the task being completed.

11. The hub system as recited in claim 10, wherein the hub manager is configured to update a hub user interface that includes the task for hub coordination, the hub user interface displayable on the associated devices that correspond to the hub members. 5

12. The hub system as recited in claim 11, wherein the hub manager is configured to add the task to a shared calendar in the hub user interface. 10

13. The hub system as recited in claim 11, wherein the hub manager is configured to associate at least one of a name and a picture of a hub member with the task in the hub user interface.

14. The hub system as recited in claim 11, wherein the hub manager is configured to post an indication for display in the hub user interface that the task has been completed. 15

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