



- (51) International Patent Classification:
H04M 11/04 (2006.01)
- (21) International Application Number:
PCT/US2013/046119
- (22) International Filing Date:
17 June 2013 (17.06.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
13/539,883 2 July 2012 (02.07.2012) US
- (71) Applicant: **APPLE INC.** [US/US]; 1 Infinite Loop, Cupertino, CA 95014 (US).
- (72) Inventors: **PHULARI, Ravindra**; 1 Infinite Loop, MS 41-2IAD, Cupertino, CA 95014 (US). **SANGHAVI, Mehul**; 1 Infinite Loop, MS 41-2IAD, Cupertino, CA 95014 (US). **GREENZEIGER, Michael**; 1 Infinite Loop, MS 41-2IAD, Cupertino, CA 95014 (US).
- (74) Agent: **NESMITH, Matthew, R.**; Wong, Cabello, Lutsch, Rutherford & Brucculeri LLP, 20333 Tomball Parkway, 6th Floor, Houston, TX 77070 (US).
- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

[Continued on next page]

- (54) Title: SUBSCRIPTION-FREE OPEN CHANNEL COMMUNICATIONS OPTIMIZED FOR PUBLIC SERVICE ANNOUNCEMENTS

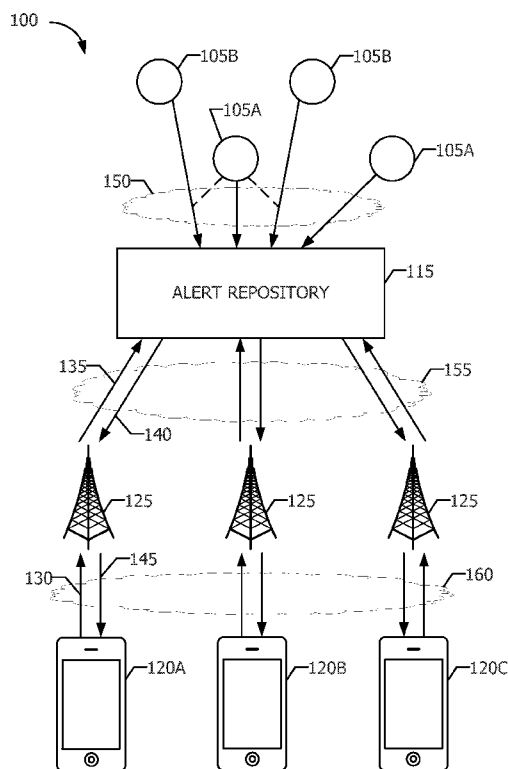


FIG. 1A

(57) Abstract: Emergency and other alerts may be disseminated to mobile devices based on the location of the devices. Registered authorities may generate alerts having associated geographical boundaries. The alerts may be compiled at a central alert repository for distribution to devices within the geographical boundaries. Information transmitted by and indicative of the location of a mobile device may be compared with the alerts to determine if the location information coincides with the geographical boundaries of any of the alerts. If it is determined that one or more of the alerts are active for the device based on the device location, the one or more alerts may be transmitted to the device over an open communication channel dedicated to the communication of such alerts without prior subscription on the part of a user of the device.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG). **Published:**

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Subscription-Free Open Channel Communications Optimized for Public Service Announcements

Background

[0001] This disclosure relates generally to the targeted dissemination of alerts based on the location of a recipient device. More particularly, but not by way of limitation, this disclosure relates to techniques for receiving alerts from authorities and transmitting the alerts to devices within a geographic area defined by the alert.

[0002] Currently, the dissemination of public safety information and alerts typically occurs through various broadcast mediums. For example, the emergency alert system (EAS) may be utilized to disseminate weather alerts, child abduction (AMBER) alerts, presidential addresses, and alerts generated by other state and local authorities via terrestrial radio, over-the-air and cable television, satellite radio, satellite television, and roadside alert signs. While alerts disseminated in this manner may reach a large number of individuals, other potentially interested individuals that do not have access to one of the communication mediums at the time the alert is distributed may not receive the alert. Moreover, while the EAS may be appropriate for alerts targeted to a relatively broad audience (*e.g.*, AMBER alerts, weather alerts, etc.), it may not be appropriate for emergency or other alerts targeted to a narrower audience. For example, it would be impractical to relay an alert relating to a fire at an apartment complex to thousands of people using the EAS.

[0003] It would be desirable to take advantage of the capabilities of mobile devices to target messages designated for either large or small audiences. For example, mobile devices such as smart phones are frequently in the possession of a user of the device, are typically capable of receiving various types of data, and are often location-aware. Current

mobile device notification services enable users to subscribe to promotional or other content based on the location of their devices. In the context of public safety and other alerts, however, it is important that alerts be directed to and received by a device on a subscription-free basis.

Summary

[0004] In one embodiment, a method for delivering targeted alerts includes receiving alert information and corresponding geographic and duration information generated by an alert authority. Location information received from a mobile device may then be compared to the geographic and duration information to determine applicability of the alert information to the mobile device. At least some of the alert information may then be transmitted for delivery to the mobile device via an open communication channel of the mobile device. The method may be embodied in program code and stored on a non-transitory storage medium. The stored program code may be executed by a processor that is part of, or controls, a device used to distribute the alerts.

[0005] In another embodiment, a device includes program code to cause the device's processor to transmit current device location information, receive an alert from an alert repository that has associated geographical boundaries that coincide with the location information, and to present content of the alert to a user of the device. The alert may be received by the device via an open communication channel that is reserved for the communication of alerts from the alert repository.

Brief Description of the Drawings

[0006] Figure **1A** is a block diagram illustrating the components of an alert system in accordance with one embodiment.

[0007] Figure **1B** is a block diagram illustrating the segregation of an alert communication channel from other device communication channels in accordance with one embodiment.

[0008] Figure **2** is a flowchart that illustrates the process by which an alert may be generated by an authority and subsequently transmitted to devices within a geographical zone specified by the alert.

[0009] Figure **3** illustrates the geographic boundaries associated with several alerts generated in accordance with one embodiment.

[0010] Figure **4** is a table illustrating the transmission of alerts to a device travelling through the geographic boundaries of the alerts illustrated in FIG. **3**.

[0011] Figure **5** is a block diagram of an illustrative electronic device in accordance with one embodiment.

Detailed Description

[0012] This disclosure pertains to the distribution of alerts to devices that have not registered to receive such alerts. In general, techniques are disclosed for compiling alerts generated by authorities, receiving location information from a device, identifying active alerts based on the location of the device, and transmitting the active alerts to the device via an open communication channel of the device. As used herein, an open communication channel refers to a communication channel that is dedicated to the communication of information associated with the alert system (*e.g.*, a communication channel prioritized over other device communication channels) and by which the device may receive alerts on a subscription-free basis. An open channel can receive various communication mediums. The lowest common denominator for both mobile and fixed devices is text messaging. Advanced devices can receive web content, audio, video, etc.

[0013] In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the inventive concepts. As part of this description, some of this disclosure's drawings represent structures and devices in block diagram form in order to avoid obscuring the invention. In the interest of clarity, not all features of an actual implementation are described in this specification. Moreover, the language used in this disclosure has been principally selected for readability and instructional purposes, and may not have been selected to delineate or circumscribe the inventive subject matter, resort to the claims being necessary to determine such inventive subject matter. Reference in this disclosure to "one embodiment" or to "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention, and multiple references to "one embodiment" or "an embodiment" should not be understood as necessarily all referring to the same embodiment.

[0014] It will be appreciated that in the development of any actual implementation (as in any development project), numerous decisions must be made to achieve the developers' specific goals (*e.g.*, compliance with system- and business-related constraints), and that these goals will vary from one implementation to another. It will also be appreciated that such development efforts might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the art of mobile device communications having the benefit of this disclosure.

[0015] Referring to FIG. **1A**, alert system **100** is illustrated in accordance with one embodiment. Alert system **100** includes multiple alert-generating authorities **105**. As will be described in greater detail below, authorities **105** may generate alerts to be communicated to devices **120** via alert system **100**. As is illustrated, there may be different

levels of authorities **105** (*e.g.*, **105A** level authorities and **105B** level authorities). In one embodiment, alerts generated by a **105B** level authority may apply to a more localized area. A **105B** level authority may be a building manager, a school administrator, an operator of an industrial plant, etc. These authorities may be able to generate localized alerts pertaining to their specific area of jurisdiction (*e.g.*, building evacuation instructions or updates regarding a school incident). Therefore, in one embodiment, the geographic boundaries of an alert generated by a **105B** level authority may be fixed such that any alert generated by such an authority is applicable within the predefined boundary (*e.g.*, a geographic boundary limited to a school campus and surrounding areas).

[0016] In one embodiment, a **105A** level authority may have broader jurisdiction for creating alerts. Examples of such authorities may include the National Weather Service (NWS), the Department of Homeland Security (DHS), the Federal Aviation Administration (FAA), etc. These **105A** level authorities may be able to generate alerts that apply to broader geographic regions. In one embodiment, a **105A** level authority may be able to define the geographic boundaries within which a generated alert will be active (*i.e.*, the boundaries may not be predefined based on the authority as may be the case for a **105B** level authority). In such an embodiment, a **105A** level authority may only be able to define boundaries for an alert where those boundaries are contained within a predefined jurisdiction. For example, a state Department of Transportation authority may be able to define boundaries for an alert within the state but not extending beyond the state's borders.

[0017] As indicated in the illustrated embodiment, a **105A** level authority may also approve alerts generated by a **105B** level authority. For example, each **105B** level authority may fall under the supervision of a **105A** level authority. Alerts generated by a **105B** level authority may

only be published after they are approved by the supervising **105A** level authority. An alert generated by a **105B** level authority may be created in the same manner as an alert generated by a **105A** level authority but may not be disseminated to devices **120** until approved by a supervisory authority. It will be understood that although two authority levels are illustrated, more or fewer levels may also exist.

[0018] According to one embodiment, alerts may be generated by authorities **105** using an alert publishing tool. The publishing tool may be a software application that interfaces with alert repository **115** via network **150**. Alert repository **115** may be a server-side application that executes on one or more alert servers while the publishing tool may be a client-side application that executes on a client device utilized by an authority **105** to create an alert. Network **150** may take any form including, but not limited to, a local area network (LAN), a wide area network (WAN) such as the Internet or a combination of local and wide-area networks. Moreover, the network may use any desired technology (wired, wireless or a combination thereof) and protocol (*e.g.*, transmission control protocol, TCP). Although network **150** is illustrated as a single network, it will be understood that authorities **105** may interface with alert repository **115** via separate networks.

[0019] Each authority may be granted credentials that allow them to access an account within alert repository **115**. An authority account may define an authority level, the geographic region that applies to generated alerts (for lower level authorities), the geographic region within which the authority may generate alerts (for higher level authorities), a supervisory authority, etc. The publishing tool may allow authority **105** to establish the parameters of an alert. For example, using the publishing tool, an authority **105** may define the alert content (*e.g.*, the text, audio, video, or other content that will be delivered with the alert), the geographic

boundaries within which the alert applies (if not predefined based on the authority level), the duration of the alert (*i.e.*, when the alert expires), etc. When an alert is created by an authority in such a manner, it may be maintained by alert repository **115** for dissemination to devices **120** according to the defined alert parameters (*e.g.*, duration and location parameters).

[0020] Alert providers **125** may interface with alert repository **115** via network **155**. Like network **150**, network **155** may take any form and may in actuality represent multiple communication networks. As used herein, an alert provider refers to an entity that interfaces between devices **120** and alert repository **115**. As will be described in greater detail below, alert system **100** may be based on an open communication standard. Therefore, according to one embodiment, alert provider **125** may be any entity capable of interfacing with devices **120** in accordance with the alert communication standard. For example, alert providers **125** may be wireless communication service providers, manufacturers of devices **120**, third party providers, etc.

[0021] Alert providers **125** may communicate with devices **120** via network **160**. Like networks **150** and **155**, network **160** may take any form and may represent multiple communication networks. Although alert providers **125** are illustrated as radio-based communication providers, it is not necessary that network **160** be a wireless communication network. Rather, devices **120** may communicate with alert providers **125** via any network that enables communications via an open communication channel in accordance with the alert system protocol.

[0022] Device **120** may regularly transmit location information to alert provider **125** (**130**). In one embodiment, location identification may be based on global positioning satellite (GPS) location information known by device **120**. In another embodiment, location identification may be

based on triangulation methods. Location information may be provided anonymously. That is, while location information may be provided by device **120**, no personally identifiable information will be transmitted. The transmission of location information may occur with or without the knowledge of a user of device **120**. Moreover, transmission of location information may occur regardless of the device's state (*i.e.*, whether or not the device is in active use). Device **120** may be a mobile device (such as a mobile phone, laptop computer, GPS device, a device integrated into an automobile, or any other type of mobile device capable of sending location information and receiving alerts via an open channel) or a fixed/wired device (such as a desktop computer, television, etc.).

[0023] In response to the receipt of location information from device **120**, alert provider **125** may query alert repository **115** for active alerts based on the location information (**135**). Alert repository **115** may respond with active alerts based on device **120**'s location (**140**). The active alerts may then be sent by alert provider **125** to device **120** (**145**).

[0024] Referring to FIG. **1B**, communications between device **120** and alert provider **125** in accordance with alert system **100** may occur via open communication channel **170**. Open communication channel **170** may be prioritized over channels for other device communications **175**. In a first embodiment, open communication channel **170** may be utilized to receive push notifications sent via alert system **100**. In a second embodiment, device **120** may continuously "listen in" on open communication channel **170** (*e.g.*, a broadcast radio wave) or may utilize open communication channel **170** to poll a service for active alerts. Thus, while regular communications activities (*e.g.*, voice calls, SMS text messaging, and other data communications) for device **120** may occur via other communication channels **175**, open communication channel **170** may be available for the communication of alerts at any time regardless of

other ongoing communications. Therefore, open communication channel **170** represents a dedicated communication channel by which communications related to alert system **100** may occur.

[0025] Regardless of the specific manner in which open communication channel **170** is implemented, device **120** will be “opted-in” to receive active alerts without any prior subscription. It should be noted that open communication channel **170** may be used for both broadcast and personalized communications. For example, alerts that apply to a broader region may be received as a broadcast over open communication channel **170** whereas more localized alerts may be received as a personalized alert (*e.g.*, pushed or pulled from the alert system) over open communication channel **170**. If alert system **100** is based on a communication standard, device makers and data/wireless carriers may be required to reserve a particular frequency, device communications port, etc. as open communication channel **170** for the communication of alerts.

[0026] In one embodiment, open communication channel **170** may be utilized for the communication of any information related to alert system **100**. For example, open communication channel **170** may be utilized to transmit device location information (**130**) as well as to receive alerts (**145**). Alerts may be delivered to device **120** via various methods. For example, alerts may be received as short messaging service (SMS) text messages, emails, instant messages, streaming audio or video, etc. Moreover, as will be described below, the type of content that is delivered to device **120** may depend on the capability of device **120**.

[0027] Referring to FIG. **2**, alert transmission process **200** may begin with the receipt of alerts from registered authorities (block **205**). As described briefly above, authorities may register to obtain access to an alert distribution system. Each authority may be granted permission to

generate alerts applicable to a predefined geographic region or within a predefined geographic region. By requiring registration, the legitimacy of an authority may be verified such that only legitimate authorities are granted access to generate alerts via alert system **100**. Upon approval, each authority may be able to generate an alert by accessing an account with the alert distribution system using authority credentials. As described above, an authority may utilize a client-side application that interfaces with a corresponding server-side application to generate an alert.

[0028] In one embodiment, an alert may include content and metadata. The content of a message may include the text, audio, video, or other data that will be presented to a user of a device on which the alert is received. The content of an alert may be defined by an authority through an alert publishing tool (*e.g.*, application software utilized to interface with the alert system). For example, an audio file may be created by an authority and attached as the content of an alert generated by the authority. In such an embodiment, the audio file may be presented (*e.g.*, downloaded and played by or streamed to) on a device receiving the alert. In another embodiment, the content of an alert may include instructions to obtain additional information (*e.g.*, a hyperlink to additional information). In yet another embodiment, an alert may include content of various forms that may be delivered based on the capabilities or properties of the device. For example, textual data associated with an alert may be delivered to a device having limited capability whereas the same alert may cause a device with greater capability to display a video clip or still image. Thus, in addition to device location information, a device may additionally send capability information such that the appropriate alert content may be selected for the device. In still another embodiment, alert content may include instructions to obtain information via another communication channel. For example, an alert may include instructions to automatically

set a device tuner to a certain frequency on which information may be broadcast over the air. This may be particularly useful when the alert includes audio or video data to be delivered in real-time over a broad geographical region (*e.g.*, the audio of a live presidential address). Rather than streaming the alert content to numerous devices individually, the devices may be instructed to tune to a particular frequency on which the content may be broadcast.

[0029] The metadata related to an alert may also be defined by an authority through an alert publishing tool. The alert metadata may include the geographic region in which the alert is applicable (*i.e.*, the zone in which devices will receive the alert), the duration of the alert (*i.e.*, when the alert will expire), and a priority level of the alert. The priority level may define how the device handles the alert. Although alerts may be delivered to applicable devices over an open communication channel that takes precedence over other device communications channels, the manner in which the alert is presented to the user upon receipt may be based upon the priority level. For example, an alert having a higher priority may cause the device to disconnect an ongoing telephone call and immediately play audio content associated with the alert whereas an alert having a lower priority may play the audio content upon termination of the phone call. The priority level may also define user level override privileges. For example, alert content associated with a certain alert priority level may not be dismissible for a certain period of time (*e.g.*, the alert content may be displayed continuously on a recipient device for 10 seconds). Alert metadata may also specify a linkage of an alert to a previous alert. If an alert is linked to an earlier alert, a device that received the earlier alert may also receive the linked alert even if the linked alert is not applicable based on the current location of the device. For example, a user of a device that evacuates an area based on a storm warning alert may receive

a linked alert that provides instructions for returning to the area even though their evacuation location may not be within the geographic boundaries specified in the linked alert.

[0030] In conjunction with the receipt of alerts from registered authorities, device location information may also be received (block **210**). As set forth above, devices **120** may periodically transmit current location information to alert provider **125** which may re-transmit the location information (*e.g.*, as a query for alerts that are active for the received location information) to alert repository **115**. Alert repository **115** may be a server-side alert application that compares device location information received from multiple alert providers **125** for numerous devices **120** with alerts generated by numerous registered authorities. More specifically, alert repository **115** may identify alerts that are in effect (*i.e.*, alerts that are within a specified duration time) and compare alert location metadata for the identified alerts to the received device location information. As such, it may be determined if any alerts generated by the registered authorities are active based on the location of a device and the pendency time of an alert (block **215**). If it is determined that one or more alerts are active based on device location information and alert location metadata (the "Yes" prong of block **215**), it may then be determined if the one or more active alerts are new to the particular device (block **220**). That is, it may be determined if the alert has been previously transmitted to the device. For example, if a device enters a geographic region in which an alert is active, the alert may be transmitted to the device. When the device thereafter transmits new location information indicating that the device is still located in the region of the alert, it should be determined that the device has already received the alert and that the alert should not be transmitted to the device again. It should be noted, however, that an alert may be created such that the content of the alert is intentionally

provided to a single device multiple times. For example, an alert that instructs residents of a particular area to evacuate the area may include metadata to repeat the alert periodically for as long as the device remains in the area.

[0031] If it is determined that there are no active alerts based on time and device information or that any active alerts have already been sent to the device (the "No" prongs of blocks **215** and **220** respectively), alert repository **115** may continue to monitor device location information to determine whether updated location information coincides with the geographical boundaries of an alert that is in effect (block **210**). If, however, it is determined that one or more active alerts have not been previously transmitted to the device (the "Yes" prong of block **220**), the active alerts may be sent to the device (*e.g.*, pushed to the device or retrieved by the device). As described above, alert system **100** may be based on an open communication standard according to which alerts may be communicated to devices via an open communication channel that takes precedence over other device communication channels and by which the alerts are delivered without prior subscription to any service by the user. Therefore, in accordance with alert transmission process **200**, alerts generated by registered authorities may be delivered to devices **120** without any subscription on the part of the device. Although the actions of process **200** have generally been described as being performed by alert repository **115**, it will be understood that some or all of the described actions may be performed by alert providers **125**. For example, alerts received at alert repository **115** may be sent to alert providers **125** and the management of active alerts for the devices that a particular alert provider **125** services may be performed by alert provider **125**. In another embodiment, an alert provider may manage or control a portion of alert repository **115**.

[0032] Referring to FIG. 3, alert system **100** is described in terms of various alerts having different geographic boundaries. In the illustrated example, alert **305** is issued for a geographical region in the San Francisco Bay Area in northern California. By way of example, alert **305** may be generated to caution people in the area of an approaching storm or road closures and the like associated with an earthquake. Alert **305** may be generated by a weather authority **105** for publication via alert system **100**. Devices within the boundaries set forth in alert **305** metadata during the time alert **305** is in effect may receive the content of the alert (*e.g.*, a text, audio, or video message) on their device according, for example, to process **200**.

[0033] Within the boundaries set forth for alert **305**, additional localized alerts may also be active. Alert **310** may provide information regarding a car accident or construction work on or near the golden gate bridge. Such an alert may be generated by a state or county transportation authority **105** and may include geographical boundaries defined by the authority within predefined jurisdictional boundaries for the authority. In the illustrated example, the geographical boundaries defined by alert **310** metadata extend along a section of highway such that the content of alert **310** may only be presented to those individuals that are approaching the area affected by the alert. As such, alerts delivered in accordance with alert system **100** may be targeted such that they are only received by individuals that are most likely to be affected by the information described in the alert. As illustrated, an authority **105** may define alert boundaries having a unique shape that is appropriate for the type of alert.

[0034] Also active within the boundaries defined by alert **305** is alert **315**. Alert **315** may provide information pertaining to travel through any United States airport of a particular size. Such an alert may be

generated by a federal agency authority **105** such as the Department of Homeland Security or the Federal Aviation Administration. In the illustrated example, alert **315** is active within geographic boundaries surrounding the San Francisco International Airport as well as the Oakland International Airport. As illustrated, an alert may not necessarily be defined by a single contiguous region but may instead include multiple isolated regions.

[0035] FIG. **3** additionally illustrates path **320** travelled by device **120** from initial location **320A** to final location **320G**. Referring to FIG. **4** in conjunction with path **320** illustrated in FIG. **3**, table **400** illustrates the management of alerts for device **120** in accordance with an embodiment of alert system **100**. Column **405** of table **400** illustrates time values, column **410** illustrates the location of device **120** along path **320** at each of the specified times, column **415** illustrates active alerts based on the location of device **120** as compared to the boundaries for alerts that are in effect, column **420** maintains a record of the alerts that device **120** has already received, and column **425** illustrates the transmission of new alerts to device **120**. In conjunction with table **400**, an indication of the duration of each of alerts **305**, **310**, and **315** is provided. As illustrated, alert **305** is active from time t_1 through time t_3 , alert **310** is active from time t_3 through time t_5 , and alert **315** is active from time t_4 through time t_7 .

[0036] At time t_0 , device **120** is at location **320A**, but no alerts are in effect. Therefore, no alerts are sent to device **120**. At time t_1 , device **120** is still situated at location **320A** and alert **305** is in effect. Because device **120** is located within the boundaries defined for alert **305**, when device **120** transmits its location information, it may be determined that alert **305** is an active alert (**415**). It may then be determined that alert **305** has not been previously sent to device **120** (**420**) and that alert **305**

should therefore be sent to device **120** at time t_1 (**425**). To reiterate, alert **305** may be transmitted to device **120** via an open communication channel by which device **120** is always accessible (*i.e.*, always accessible in a powered-on state).

[0037] At time t_2 , alert **305** is still in effect and device **120** has moved to location **320B**. It may be determined from device **120**'s location information that alert **305** is still an active alert for device **120** (**415**), that alert **305** has already been sent to device **120** (**420**), and that no additional alerts need to be transmitted to device **120** (**425**). At time t_3 , both alert **305** and alert **310** are in effect and device **120** has moved to location **320C**. It may be determined from device **120**'s location information that alerts **305** and **310** are active alerts (**415**), that alert **305** has already been sent to device **120** (**420**), and that alert **310** should be transmitted to device **120** (**425**). At time t_4 , alerts **310** and **315** are in effect, alert **305** has expired, and device **120** is at location **320D**. Based on this information, it may be determined that alert **310** is the only active alert for device **120** (**415**), that alert **310** has already been sent to device **120** (**420**), and that no alerts should be sent at time t_4 (**425**). Although table **400** illustrates data pertaining to the prior transmission of alert **305** to device **120** at times t_4 through t_7 , in an alternate embodiment, such information may be deleted when the alert expires. At time t_5 , alerts **310** and **315** are in effect and device **120** is at location **320E**. Based on this information, it may be determined that alert **315** is an active alert for device **120** (**415**). Moreover, because alert **315** has not been previously transmitted to device **120** (**420**), it may be sent at time t_5 (**425**). At time t_6 , alert **315** is in effect but device **120** has travelled outside of the boundaries for alert **315** to location **320F**. Thus, alert **315** is not an active alert at time t_6 (**415**). At time t_7 , alert **315** is still in effect and device **120** has re-entered the boundaries for alert **315**

at location **320G**. Therefore, alert **315** is again an active alert for device **120** at time t_7 (**415**). However, because alert **315** has been previously transmitted to device **120** (**420**), the alert is not re-transmitted based on device **120**'s re-entry into the alert **315** boundaries. In another embodiment, alert **315** metadata may indicate that the content of alert **315** should be re-transmitted based on re-entry. In such an embodiment, alert **315** may be re-transmitted to device **120** upon device **120**'s re-entry into the boundaries for alert **315**. Information such as that indicated in table **400** may be maintained in a data store at either alert repository **115** or alert provider **125** for the management of alerts for numerous devices **120**. As described above, the alert content delivered to a particular device may be dependent on the capabilities of the device. Accordingly, a data store at either alert repository **115** or alert provider **125** may additionally include device capability information such that the appropriate alert content may be delivered to a device.

[0038] Although the example alerts described in FIGS. **3** and **4** apply to relatively large geographical areas, it will be understood that alert system **100** is equally applicable to alerts that apply to more localized geographical areas. For example, a building manager authority may generate an alert instructing residents and visitors of the building (*i.e.*, anyone within the vicinity of the building as defined by the boundaries of the alert) to evacuate the building due to a fire. Thus, in contrast to existing alert systems, alerts may be generated by registered authorities and may be targeted such that they are distributed only to those individuals that may be affected by the alert (*e.g.*, only those individuals in a localized area).

[0039] Referring to FIG. **5**, a simplified functional block diagram of illustrative electronic device **500** is shown according to one embodiment. Electronic device **500** may include processor **505**, display **510**, user

interface **515**, graphics hardware **520**, device sensors **525** (*e.g.*, proximity sensor/ambient light sensor, accelerometer and/or gyroscope), microphone **530**, audio codec(s) **535**, speaker(s) **540**, communications circuitry **545**, digital image capture unit **550**, video codec(s) **555**, memory **560**, storage **565**, and communications bus **570**. Electronic device **500** may be, for example, a personal digital assistant (PDA), personal music player, mobile telephone, notebook, laptop or a tablet computer, desktop computer, or server computer. More particularly, any of the devices described above (*e.g.*, devices **120** or the client and server devices for generating alerts) may take the form of device **500**.

[0040] Processor **505** may execute instructions necessary to carry out or control the operation of many functions performed by device **500**. Processor **505** may, for instance, drive display **510** and receive user input from user interface **515**. User interface **515** can take a variety of forms, such as a button, keypad, dial, a click wheel, keyboard, display screen and/or a touch screen. Processor **505** may also, for example, be a system-on-chip such as those found in mobile devices and include a dedicated graphics processing unit (GPU). Processor **505** may be based on reduced instruction-set computer (RISC) or complex instruction-set computer (CISC) architectures or any other suitable architecture and may include one or more processing cores. Graphics hardware **520** may be special purpose computational hardware for processing graphics and/or assisting processor **505** to process graphics information. In one embodiment, graphics hardware **520** may include a programmable graphics processing unit (GPU).

[0041] Sensor and camera circuitry **550** may capture still and video images that may be processed, at least in part, by video codec(s) **555** and/or processor **505** and/or graphics hardware **520**, and/or a dedicated image processing unit incorporated within circuitry **550**. Images so

captured may be stored in memory **560** and/or storage **565**. Memory **560** may include one or more different types of media used by processor **505** and graphics hardware **520** to perform device functions. For example, memory **560** may include memory cache, read-only memory (ROM), and/or random access memory (RAM). Storage **565** may store media (*e.g.*, audio, image and video files), computer program instructions or software, preference information, device profile information, and any other suitable data. Storage **565** may include one or more non-transitory storage mediums including, for example, magnetic disks (fixed, floppy, and removable) and tape, optical media such as CD-ROMs and digital video disks (DVDs), and semiconductor memory devices such as Electrically Programmable Read-Only Memory (EPROM), and Electrically Erasable Programmable Read-Only Memory (EEPROM). Memory **560** and storage **565** may be used to tangibly retain computer program instructions or code organized into one or more modules and written in any desired computer programming language. When executed by, for example, processor **505** such computer program code may implement one or more of the methods described herein.

[0042] It is to be understood that the above description is intended to be illustrative, and not restrictive. The material has been presented to enable any person skilled in the art to make and use the inventive concepts described herein, and is provided in the context of particular embodiments, variations of which will be readily apparent to those skilled in the art (*e.g.*, some of the disclosed embodiments may be used in combination with each other). Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention therefore should be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. In the appended claims, the terms "including" and "in

which" are used as the plain-English equivalents of the respective terms
"comprising" and "wherein."

Claims

1. A non-transitory program storage device, readable by a processor and comprising instructions stored thereon to cause the processor to:
 - receive alert information having corresponding geographic region information from an alert authority;
 - receive location information from a device;
 - determine that the alert information is applicable to the device based, at least in part, on the received location information and the corresponding geographic region information; and
 - transmit at least some of the alert information for delivery to the device via an open communication channel of the device.
2. The non-transitory program storage device of claim 1, wherein the alert information comprises alert content and alert metadata.
3. The non-transitory program storage device of claim 2, wherein the alert metadata comprises an alert duration.
4. The non-transitory program storage device of claim 2, wherein the alert metadata comprises an alert priority level.
5. The non-transitory program storage device of claim 2, wherein the alert content comprises textual data.
6. The non-transitory program storage device of claim 1, wherein the transmitted alert information comprises user level override information.

7. The non-transitory program storage device of claim 1, wherein the instructions to cause the processor to receive alert information comprise instructions to cause the processor to receive alert information having a content portion that is dependent upon device capability.
8. The non-transitory program storage device of claim 7, further comprising instructions to receive device capability information from the device.
9. The non-transitory program storage device of claim 8, wherein the instructions to cause the processor to transmit at least some of the alert information for delivery to the device via an open communication channel comprise instructions to cause the processor to select a type of alert content from the alert information based, at least in part, on the received capability information.
10. The non-transitory program storage device of claim 1, further comprising instructions to cause the processor to determine whether any of the alert information has been previously transmitted to the device.
11. The non-transitory program storage device of claim 10, wherein the instructions to cause the processor to transmit at least some of the alert information for delivery to the device via an open communication channel comprise instructions to cause the processor to transmit only alert information that has not been previously transmitted to the device.

12. An alert publishing method, comprising:
 - receiving alert information generated by a registered authority through an alert publishing system, the alert information having associated geographical boundaries and an associated duration time;
 - receiving device location information from a device;
 - determining the device location information corresponds to a location within the geographical boundaries;
 - determining the alert information is in effect based on the duration time; and
 - sending at least some of the alert information to the device via an open communication channel of the device.
13. The method of claim 12, wherein the alert information comprises instructions to cause the device to retrieve information via another communication channel.

14. The method of claim 13, wherein the instructions to cause the device to retrieve information via another communication channel comprise instructions to cause the device to set a device tuner to receive a broadcast associated with the alert information.
15. The method of claim 12, wherein the geographical boundaries comprise two or more isolated geographical regions.
16. A device, comprising:
 - a memory;
 - a display element; and
 - a processor operatively coupled to the memory and the display element, the processor adapted to execute program code stored in the memory to –
 - transmit information indicative of a current location of the device,
 - receive an alert from a central alert repository having an associated geographical boundary that coincides with the current location, the alert received over an open communication channel reserved for communication of alerts from the central alert repository, and
 - present content of the alert to a user of the device.
17. The device of claim 16, wherein the program code to cause the processor to present content of the alert to a user of the device comprises program code to cause the processor to display the content on the display element.
18. The device of claim 16, wherein the content comprises audio content and wherein the program code to cause the processor to present content of the alert to a user of the device comprises program code

to render the audio content on the device.

19. The device of claim 16, wherein the program code to cause the processor to receive an alert from a central alert repository comprises program code to receive a priority level associated with the alert.
20. The device of claim 19, wherein the program code to cause the processor to present content of the alert to a user of the device comprises program code to cause the processor to present the content based, at least in part, on the priority level.

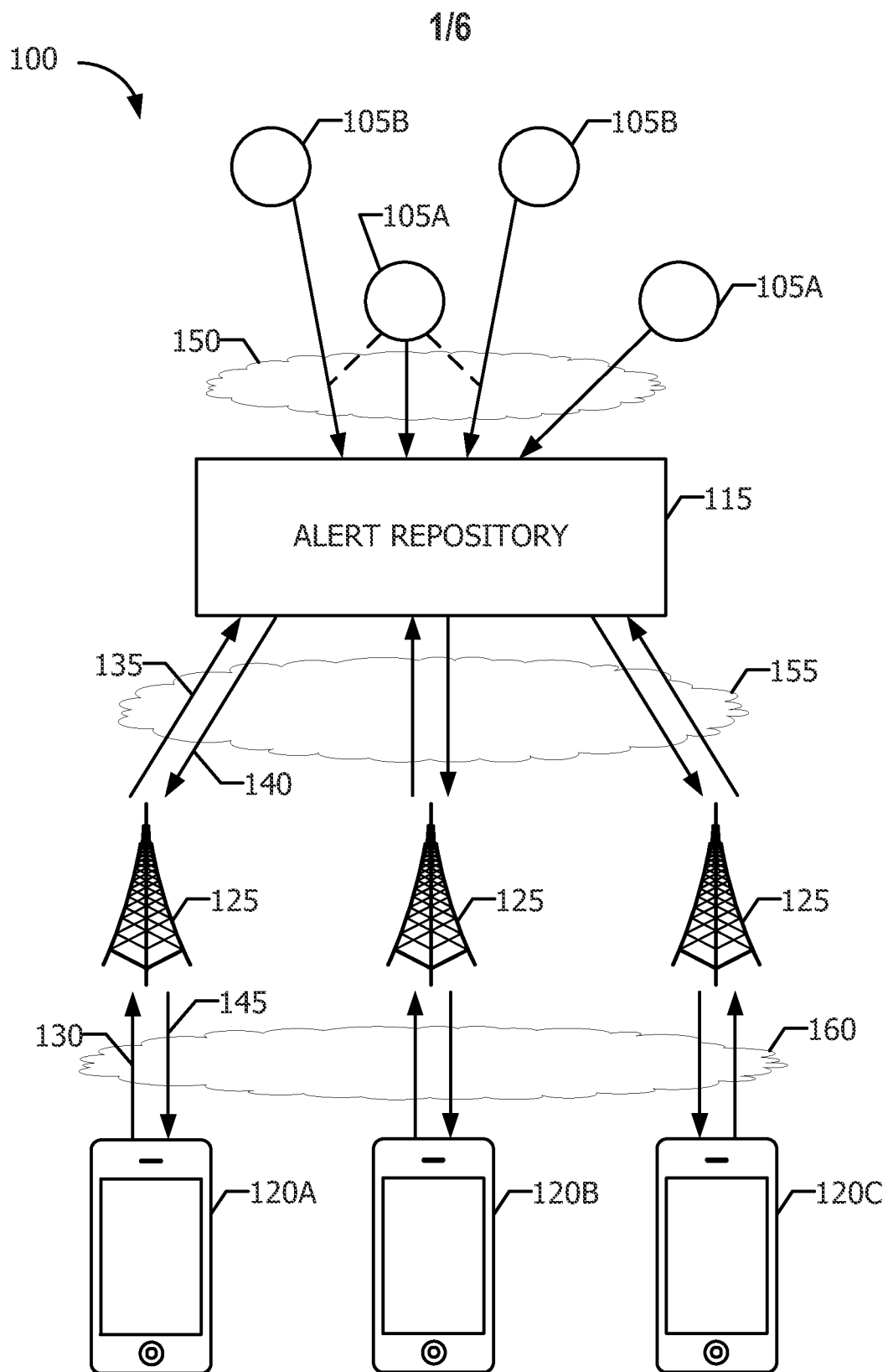
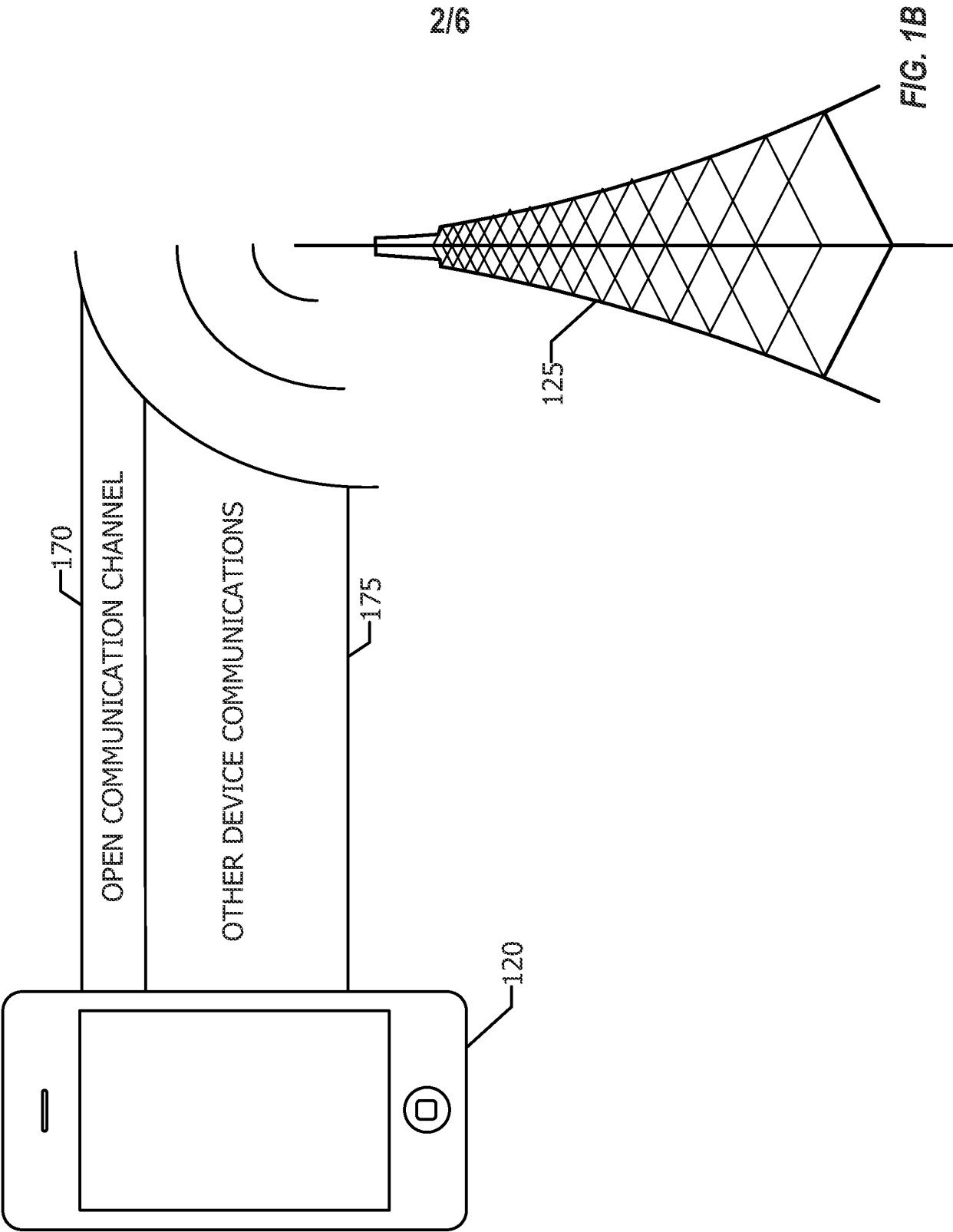


FIG. 1A



3/6

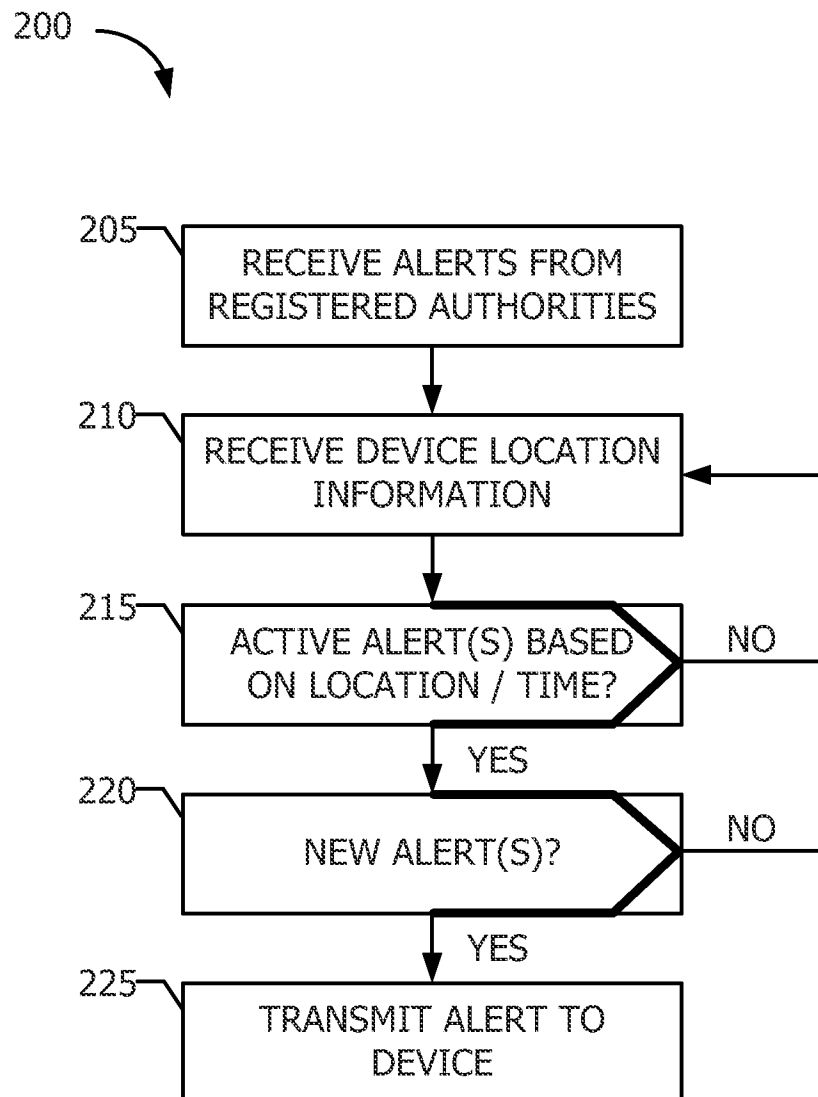


FIG. 2

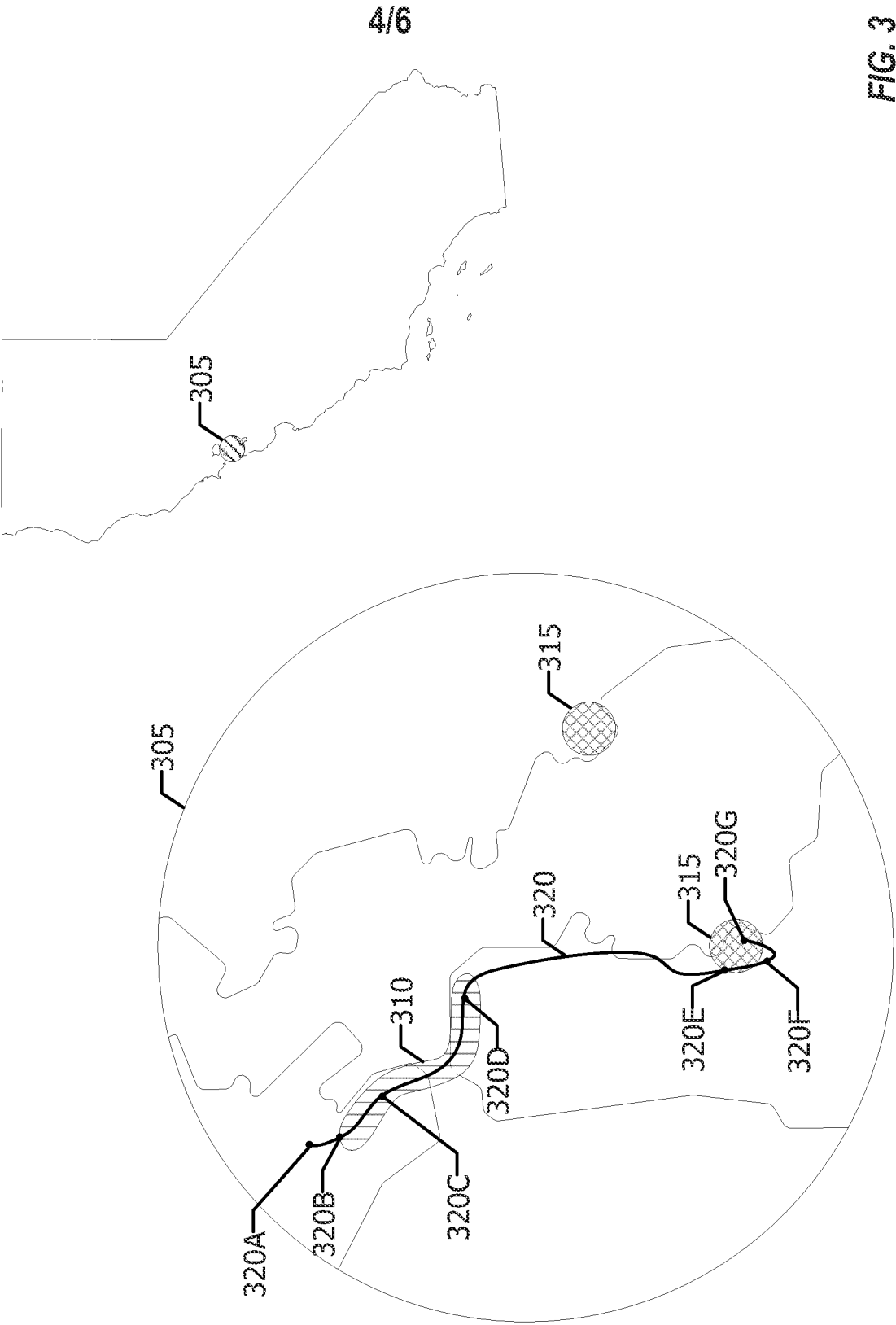


FIG. 3

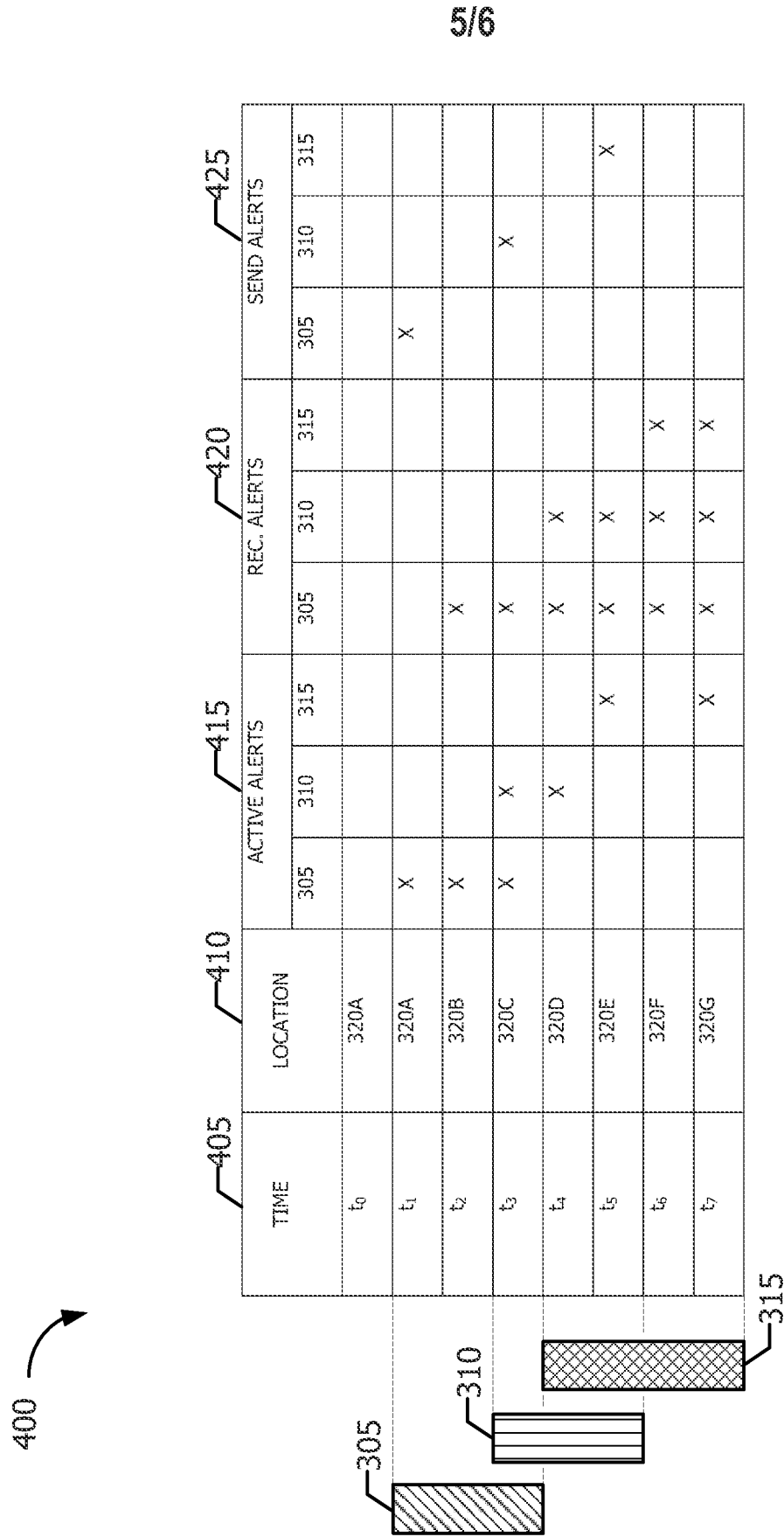


FIG. 4

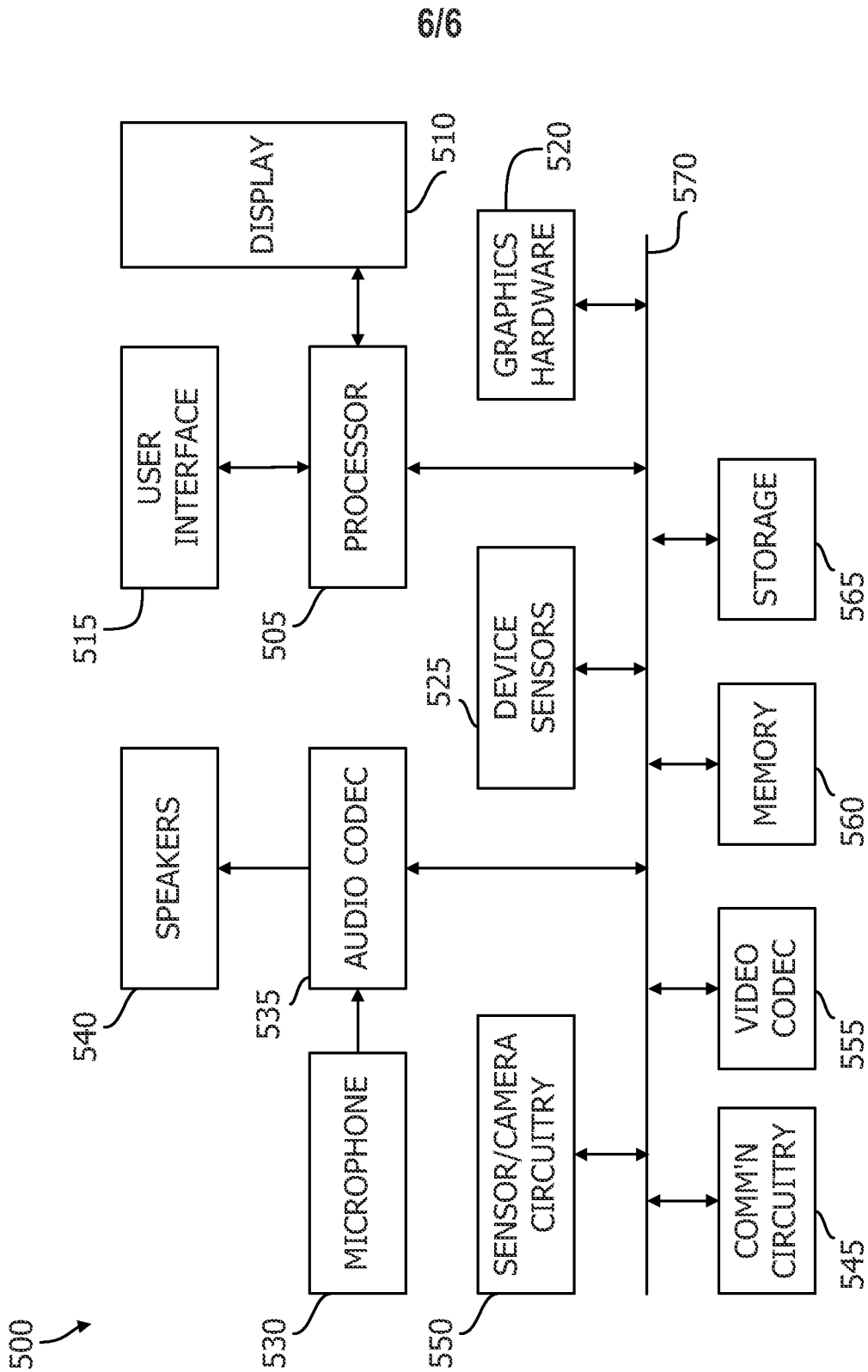


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/046119

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H04M 11/04 (2013.01)

USPC - 455/404.1

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - H04M 11/00, 11/02, 11/04 (2013.01)

USPC -455/403, 404.1, 404.2

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

CPC - H04M 11/00, 11/02, 11/04 (2013.01)

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

Orbit, Google Patents, Google Scholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/0325538 A1 (SENNETT et al) 31 December 2009 (31.12.2009) entire document	1,2,4,5,16,19,20
Y		3, 6-15, 17, 18
Y	WO 2007/001280 A1 (BRIDGE et al) 04 January 2007 (04.01.2007) entire document	3,12-15,17,18
Y	EP 2,020,648 A2 (MODI et al) 04 February 2009 (04.02.2009) entire document	6
Y	US 2009/0227224 A1 (AFTELAK et al) 10 September 2009 (10.09.2009) entire document	7-11,13,14

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

01 November 2013

Date of mailing of the international search report

08 NOV 2013

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774