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(54) **ASSOCIATING REQUESTS FOR CONTENT WITH A CONFIRMED LOCATION**

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CPC ***H04W 4/04*** (2013.01)

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See application file for complete search history.

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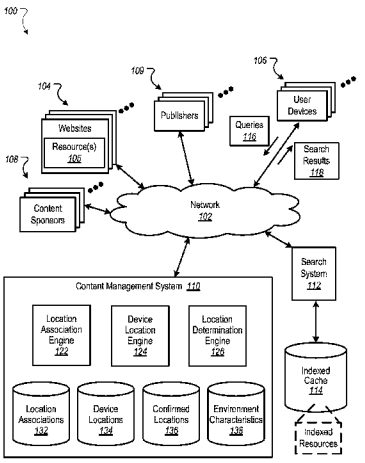
(57) **ABSTRACT**

Methods, systems, and apparatus include computer programs encoded on a computer-readable storage medium, including a method for providing content. A first confirmation is received of a location associated with a user identifier. A confirmed location identifies a physical address of a user device associated with the user identifier. Subsequent to the first confirmation, location data associated with a user device associated with the user identifier is processed, including determining that the user device is near the confirmed location. A second confirmation confirms that sufficient occurrences have identified of a presence of a device associated with the user identifier near the confirmed location. Characteristics of an environment accessed by the user are determined and stored in association with the confirmed location. Requests are received from other users. Characteristics of a given request are compared with stored characteristics. When comparing indicates a match, the confirmed location is associated with the subsequent request.

20 Claims, 4 Drawing Sheets



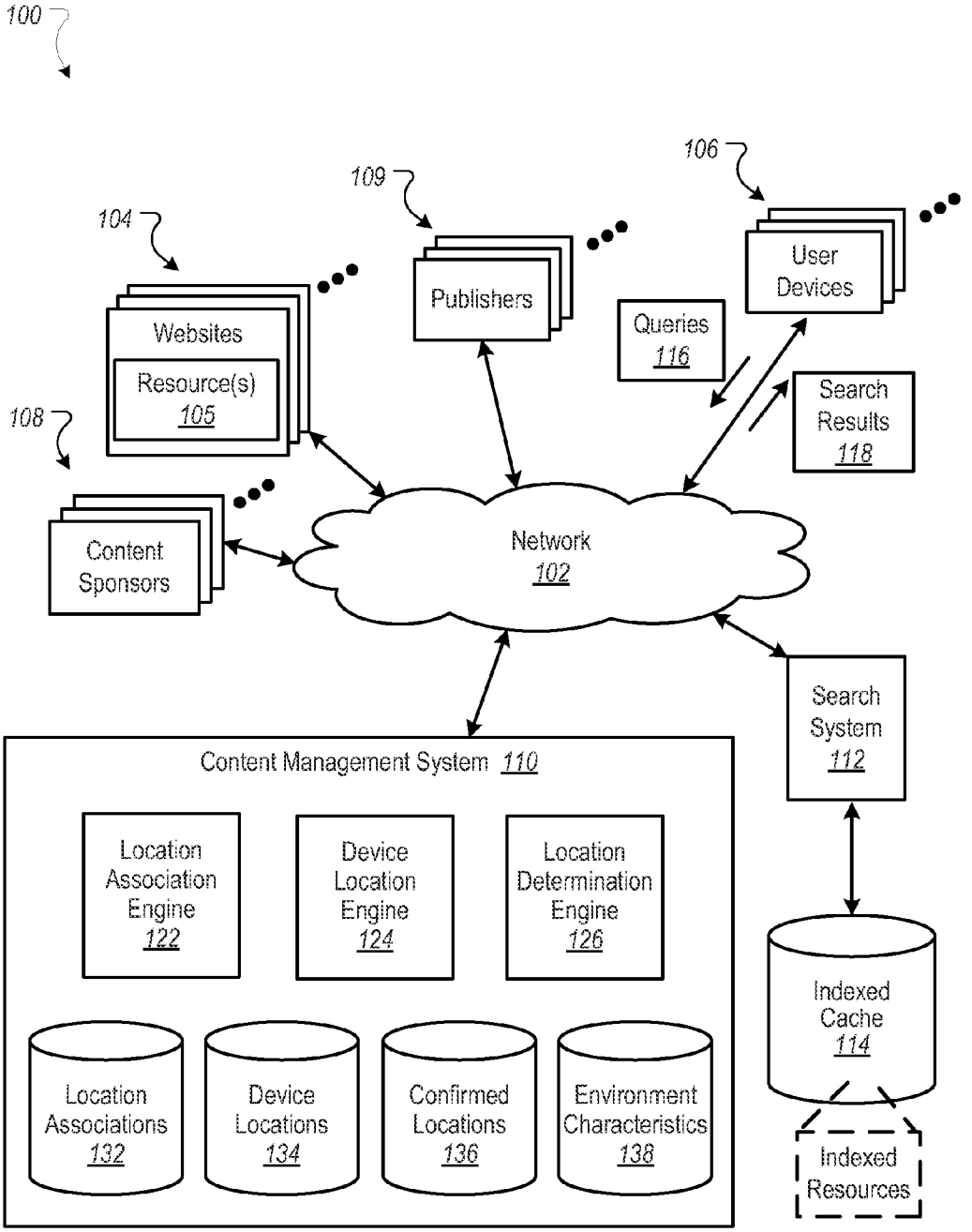

100
106
109
104
User Devices
Publishers
Websites
Resource(s) 105
Queries 116
Search Results 118
108
Content Sponsors
Network 102
Search System 112
Content Management System 110
Location Association Engine 122
Device Location Engine 124
Location Determination Engine 126
Indexed Cache 114
Location Associations 132
Device Locations 134
Confirmed Locations 136
Environment Characteristics 138
Indexed Resources

FIG. 1

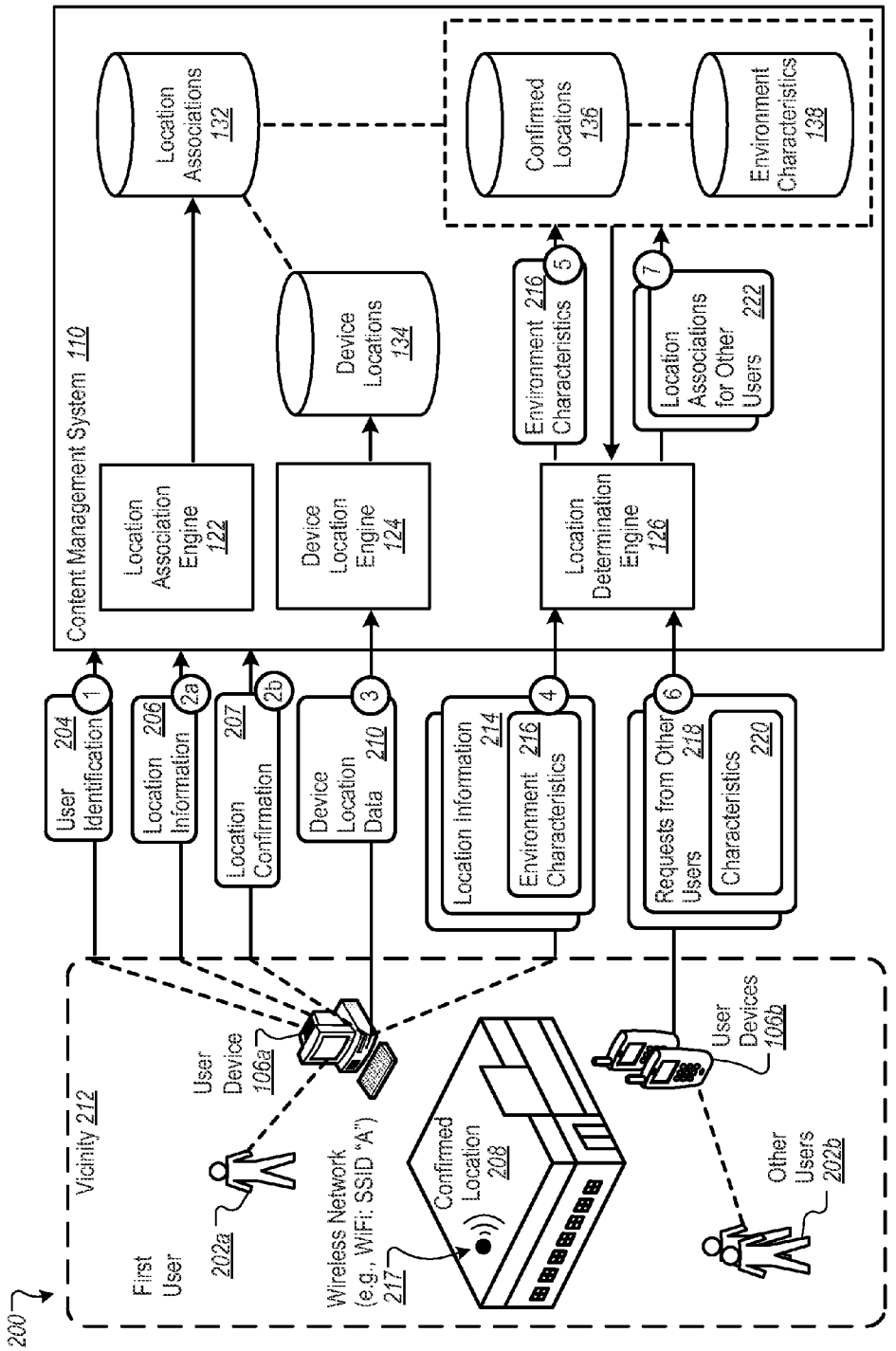

200
Vicinity 212
First User
202a
User Device 106a
Wireless Network (e.g., WiFi: SSID "A") 217
Confirmed Location 208
User Devices 106b
Other Users 202b
User Identification 204
Location Information 206
Location Confirmation 207
Device Location Data 210
Location Information 214
Environment Characteristics 216
Requests from Other Users 218
Characteristics 220
Content Management System 110
Location Association Engine 122
Device Location Engine 124
Location Determination Engine 126
Location Associations 132
Device Locations 134
Confirmed Locations 136
Environment Characteristics 138
Environment 216 Characteristics
Location Associations for Other Users 222

FIG. 2

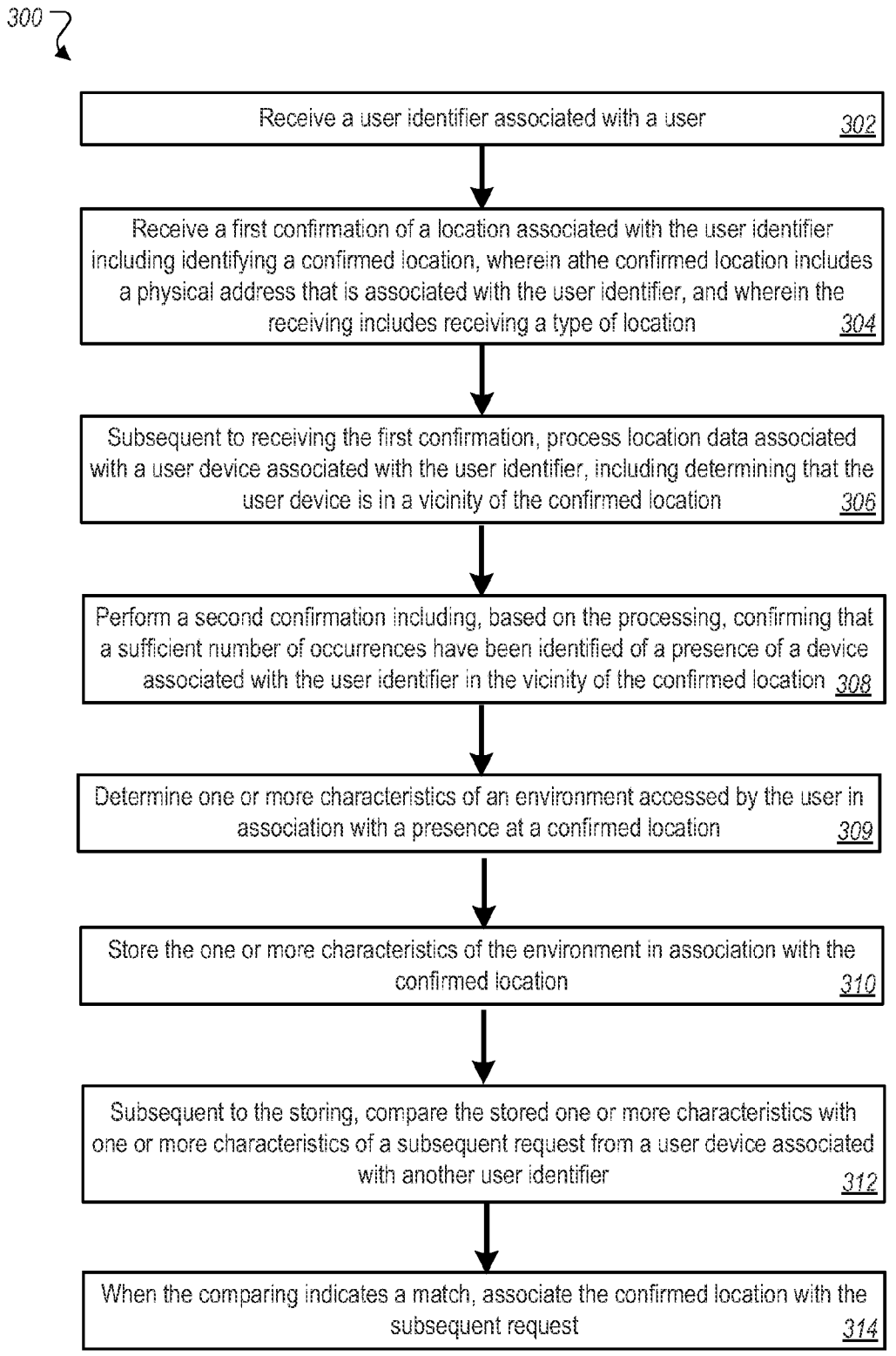
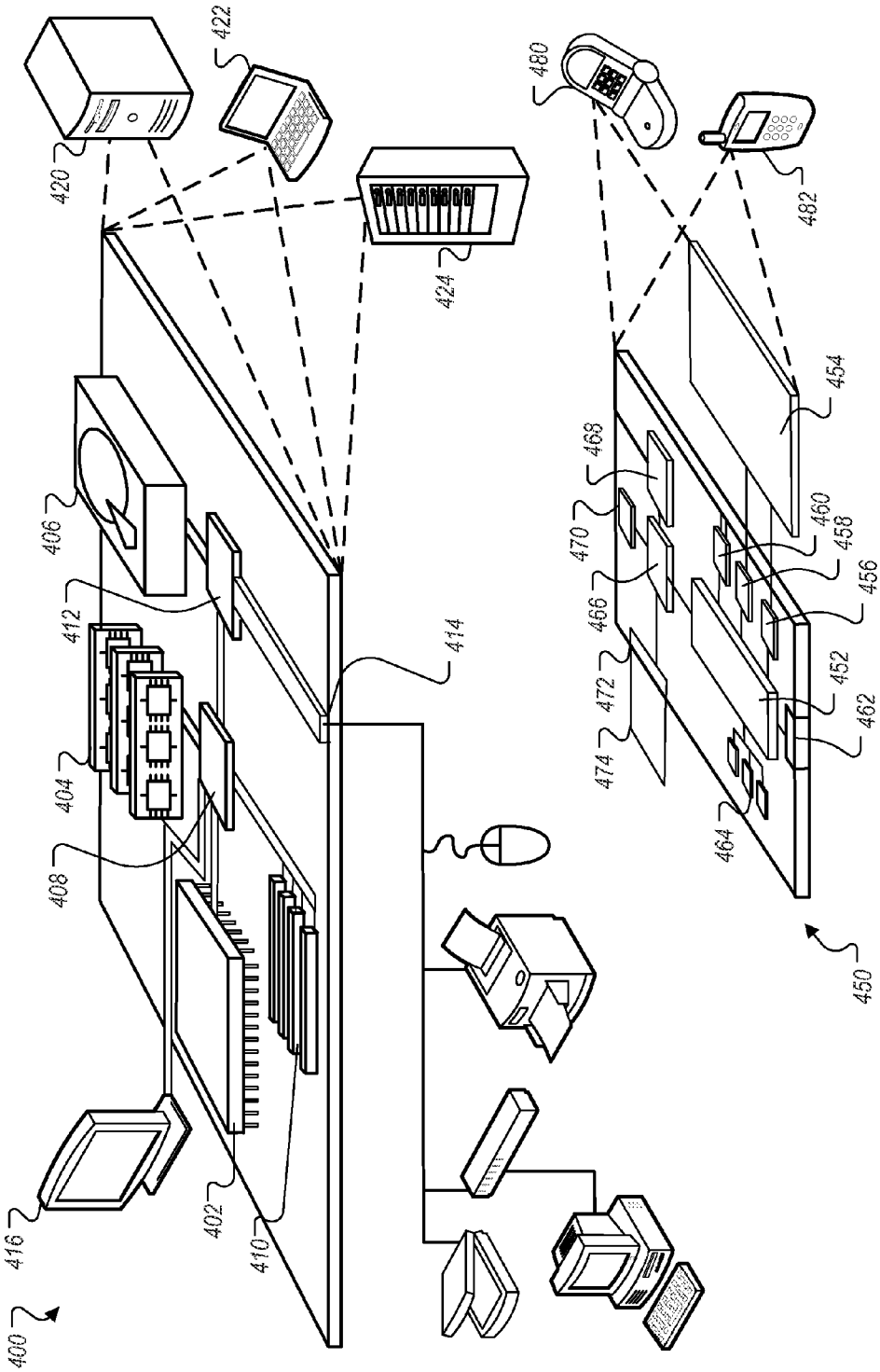

300
Receive a user identifier associated with a user 302
Receive a first confirmation of a location associated with the user identifier including identifying a confirmed location, wherein athe confirmed location includes a physical address that is associated with the user identifier, and wherein the receiving includes receiving a type of location 304
Subsequent to receiving the first confirmation, process location data associated with a user device associated with the user identifier, including determining that the user device is in a vicinity of the confirmed location 306
Perform a second confirmation including, based on the processing, confirming that a sufficient number of occurrences have been identified of a presence of a device associated with the user identifier in the vicinity of the confirmed location 308
Determine one or more characteristics of an environment accessed by the user in association with a presence at a confirmed location 309
Store the one or more characteristics of the environment in association with the confirmed location 310
Subsequent to the storing, compare the stored one or more characteristics with one or more characteristics of a subsequent request from a user device associated with another user identifier 312
When the comparing indicates a match, associate the confirmed location with the subsequent request 314

FIG. 3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464
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FIG. 4

ASSOCIATING REQUESTS FOR CONTENT WITH A CONFIRMED LOCATION

BACKGROUND

This specification relates to information presentation.

The Internet provides access to a wide variety of resources. For example, video and/or audio files, as well as webpages for particular subjects or particular news articles, are accessible over the Internet. Access to these resources presents opportunities for other content (e.g., advertisements) to be provided with the resources. For example, a webpage can include slots in which content can be presented. These slots can be defined in the webpage or defined for presentation with a webpage, for example, along with search results. Content in these examples can be of various formats, while the devices that consume (e.g., present) the content can be equally varied in terms of their type and capabilities.

Content slots can be allocated to content sponsors as part of a reservation system, or in an auction. For example, content sponsors can provide bids specifying amounts that the sponsors are respectively willing to pay for presentation of their content. In turn, an auction can be run, and the slots can be allocated to sponsors according, among other things, to their bids and/or a likelihood that the user will interact with the content presented.

SUMMARY

In general, one innovative aspect of the subject matter described in this specification can be implemented in methods that include a computer-implemented method for providing content. The method includes receiving a user identifier associated with a user. The method further includes receiving a first confirmation of a location associated with the user identifier including identifying a confirmed location, wherein the confirmed location includes a physical address that is associated with the user identifier, and wherein the receiving includes receiving a type of location. The method further includes, subsequent to receiving the first confirmation, processing location data associated with a user device associated with the user identifier, including determining that the user device is in a vicinity of the confirmed location. The method further includes performing, using one or more processors, a second confirmation including, based on the processing, confirming that a sufficient number of occurrences have been identified of a presence of a device associated with the user identifier in the vicinity of the confirmed location. The method further includes determining one or more characteristics of an environment accessed by the user in association with a presence at a confirmed location. The method further includes storing the one or more characteristics of the environment in association with the confirmed location. The method further includes subsequent to the storing, comparing the stored one or more characteristics with one or more characteristics of a subsequent request from a user device associated with another user identifier. The method further includes, when the comparing indicates a match, associating the confirmed location with the subsequent request.

These and other implementations can each optionally include one or more of the following features. Processing location data can include receiving location data from the user when the user is logged in, and the location data can be received through a wireless network. Confirming a sufficient number of occurrences can include determining a plurality of occurrences of the presence of the user are received from a location in the vicinity to the confirmed location based on a network identifier for a wireless network and one or more network signal quality metrics associated with a received request. The network identifier can be a service set identifier (SSID) or a media access control (MAC) address, and the one or more network signal quality metrics can include a signal strength. Determining the one or more characteristics can include identifying signal strength and wireless network identifier information. Associating the confirmed location can further include using the confirmed location for selecting content to provide in response to the subsequent request. The second confirmation can include determining signal strength of a wireless signal associated with a signal that includes the location data, comparing the signal strength to a threshold, and when the signal strength exceeds the threshold, storing a network identifier for the wireless network associated with wireless signal in association with the confirmed location. Storing the characteristics can include storing a confirmed location and a network identifier for the wireless network. Associating the confirmed location with the subsequent request can include identifying an entity associating with the confirmed location and associating the identified entity with the subsequent request. The entity can be a business and the confirmed location can be a brick-and-mortar location associated with the entity.

In general, another innovative aspect of the subject matter described in this specification can be implemented in computer program products that include a computer program product tangibly embodied in a computer-readable storage device and comprising instructions. The instructions, when executed by one or more processors, cause the processor to: receive a first confirmation of a location associated with the user identifier including identifying a confirmed location, wherein athe confirmed location includes a physical address that is associated with the user identifier, and wherein the receiving includes receiving a type of location; subsequent to receiving the first confirmation, process location data associated with a user device associated with the user identifier, including determining that the user device is in a vicinity of the confirmed location; perform a second confirmation including, based on the processing, confirming that a sufficient number of occurrences have been identified of a presence of a device associated with the user identifier in the vicinity of the confirmed location; determine one or more characteristics of an environment accessed by the user in association with a presence at a confirmed location; store the one or more characteristics of the environment in association with the confirmed location; subsequent to the storing, compare the stored one or more characteristics with one or more characteristics of a subsequent request from a user device associated with another user identifier; and when the comparing indicates a match, associate the confirmed location with the subsequent request.

These and other implementations can each optionally include one or more of the following features. Processing location data can include receiving location data from the user when the user is logged in, and the location data can be received through a wireless network. Confirming a sufficient number of occurrences can include determining a plurality of occurrences of the presence of the user are received from a location in the vicinity to the confirmed location based on a network identifier for a wireless network and one or more network signal quality metrics associated with a received request. The network identifier can be a service set identifier (SSID) or a media access control (MAC) address, and the one or more network signal quality metrics can include a signal strength. Associating the confirmed location can further

include using the confirmed location for selecting content to provide in response to the subsequent request.

In general, another innovative aspect of the subject matter described in this specification can be implemented in systems, including a system comprising one or more processors and one or more memory elements including instructions. The instructions, when executed, cause the one or more processors to: receive a first confirmation of a location associated with the user identifier including identifying a confirmed location, wherein athe confirmed location includes a physical address that is associated with the user identifier, and wherein the receiving includes receiving a type of location; subsequent to receiving the first confirmation, process location data associated with a user device associated with the user identifier, including determining that the user device is in a vicinity of the confirmed location; perform a second confirmation including, based on the processing, confirming that a sufficient number of occurrences have been identified of a presence of a device associated with the user identifier in the vicinity of the confirmed location; determine one or more characteristics of an environment accessed by the user in association with a presence at a confirmed location; store the one or more characteristics of the environment in association with the confirmed location; subsequent to the storing, compare the stored one or more characteristics with one or more characteristics of a subsequent request from a user device associated with another user identifier; and when the comparing indicates a match, associate the confirmed location with the subsequent request.

These and other implementations can each optionally include one or more of the following features. Processing location data can include receiving location data from the user when the user is logged in, and the location data can be received through a wireless network. Confirming a sufficient number of occurrences can include determining a plurality of occurrences of the presence of the user are received from a location in the vicinity to the confirmed location based on a network identifier for a wireless network and one or more network signal quality metrics associated with a received request. The network identifier can be a service set identifier (SSID) or a media access control (MAC) address, and the one or more network signal quality metrics can include a signal strength. Associating the confirmed location can further include using the confirmed location for selecting content to provide in response to the subsequent request.

Particular implementations may realize none, one or more of the following advantages. User identifiers associated with users can be determined as being present in a confirmed location when environmental characteristics (e.g., network information) associated with the users' network access can be matched to environmental characteristics of a confirmed location identified previously, e.g., by a first user.

The details of one or more implementations of the subject matter described in this specification are set forth in the accompanying drawings and the description below. Other features, aspects, and advantages of the subject matter will become apparent from the description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of an example environment for providing content.

FIG. **2** shows an example system for associating received requests from users with a particular confirmed location of a user identifier.

FIG. **3** is a flowchart of an example process for associating received requests from users with a particular confirmed location of a user identifier.

FIG. **4** is a block diagram of an example computer system that can be used to implement the methods, systems and processes described in this disclosure.

Like reference numbers and designations in the various drawings indicate like elements.

DETAILED DESCRIPTION

Systems, methods, and computer program products are described for associating received requests from users with a particular confirmed location (e.g., of a first user). For example, a first user accessing a network (e.g., a particular WiFi network) can identify a particular location associated with the accessing (e.g., a workplace or home setting). Subsequently, repeated occurrences can be logged of the first user using the same network for the confirmed location. Environment characteristics, including network identifiers, can be stored in association with the confirmed location. Requests (e.g., requests for content) received from other users can also include environment characteristics. When it is determined that the environment characteristics of the received requests match the environment characteristics that are associated with the confirmed location, then the received requests can also be associated with the confirmed location, even when such requests are from other different users. The associations can be used, for example, when selecting content to be provided responsive to the requests or used for other reasons.

For situations in which the systems discussed here collect and/or use personal information about users, the users may be provided with an opportunity to enable/disable or control programs or features that may collect and/or use personal information (e.g., information about a user's social network, social actions or activities, a user's preferences or a user's current location). In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information associated with the user is removed. For example, a user's identity may be anonymized so that the no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined.

FIG. **1** is a block diagram of an example environment **100** for providing content. The example environment **100** includes a content management system **110** for selecting and providing content in response to requests for content. The example environment **100** includes a network **102**, such as a local area network (LAN), a wide area network (WAN), the Internet, or a combination thereof. The network **102** connects websites **104** (e.g., addressable resources), user devices **106**, content sponsors **108** (e.g., advertisers), publishers **109**, and the content management system **110**. The example environment **100** may include many thousands of websites **104**, user devices **106**, content sponsors **108** and publishers **109**.

The environment **100** can include plural data stores, which can be stored locally by the content management system **110**, stored somewhere else and accessible using the network **102**, generated as needed from various data sources, or some combination of these. Further, some data stores described herein may include identifiers that can be used to match or access corresponding data records or other information that are stored elsewhere, e.g. locally and/or remotely.

A data store of location associations **132**, for example, can store information that associates a user identifier with an

identified location. For example, the identified location can include, for example, a physical address of a location that the user designates as a workplace location, a home location, or some other physical location.

A data store of device locations **134**, for example, can include information on a device basis (e.g., by device ID) that identifies a location associated with a device. For example, the information can indicate that the user's workplace computer, having a particular device identifier, is associated with the user's workplace and corresponding physical address.

A data store of confirmed locations **136**, for example, can include information indicating a physical location at which a user device having a user identifier is confirmed to have been present on a number of occurrences. For example, a confirmed location can be a brick-and-mortar location, such as the user's workplace, home, or another physical location at which the user device having the user identifier is or has been present.

A data store of environment characteristics **138**, for example, can include information for characteristics of an environment associated with a user, or for a user device associated with the user identifier. For example, characteristics can be included with requests that are received from users, or included with received location information associated with users. Characteristics can include, for example, network information, such as network identifiers associated with wireless networks. Characteristics can also include one or more network signal quality metrics, such as signal strength.

The content management system **110** can include plural engines, some or all of which may be combined or separate, and may be co-located or distributed (e.g., connected over the network **102**). A location association engine **122**, for example, can identify the first user and receive confirmation of a location that is associated with the user identifier. The location confirmation can also include information that identifies the location's type (e.g., a work location), such as if the first user **202***a* indicates that the user device **106***a* is situated at the user's workplace (e.g., the confirmed location **208**).

A device location engine **124**, for example, can process device location data associated with a user device and determine whether or not the user device is in a vicinity of a confirmed location. For example, the determining can include determining that the user device **106***a* is networked through a particular network (e.g., a WiFi network) of the confirmed location and whether the associated signal strength meets a minimum threshold signal strength.

A location determination engine **126**, for example, can use location information processed from a user device to confirm that a sufficient number of occurrences have been identified to confirm a presence of the user device (and associated user) in a vicinity of the location. The location determination engine **126** can also receive or determine environment characteristics (e.g., a network identifier of wireless network) in association with the location information, e.g., for subsequent use in determining that other users' user devices are in the same vicinity. In some implementations, global positioning system (GPS) capabilities of the user device can provide location information (e.g., a geographic location) associated with the user identifier, e.g., that the location determination engine **126** can use to confirm a presence of the user device in a vicinity of the location.

A website **104** includes one or more resources **105** associated with a domain name and hosted by one or more servers. An example website is a collection of webpages formatted in hypertext markup language (HTML) that can contain text, images, multimedia content, and programming elements, such as scripts. Each website **104** can be maintained by a content publisher, which is an entity that controls, manages and/or owns the website **104**.

A resource **105** can be any data that can be provided over the network **102**. A resource **105** can be identified by a resource address that is associated with the resource **105**. Resources include HTML pages, word processing documents, portable document format (PDF) documents, images, video, and news feed sources, to name only a few. The resources can include content, such as words, phrases, images, video and sounds, that may include embedded information (such as meta-information hyperlinks) and/or embedded instructions (such as JavaScript™ scripts).

A user device **106** is an electronic device that is under control of a user and is capable of requesting and receiving resources over the network **102**. Example user devices **106** include personal computers (PCs), televisions with one or more processors embedded therein or coupled thereto, set-top boxes, gaming consoles, mobile communication devices (e.g., smartphones), tablet computers and other devices that can send and receive data over the network **102**. A user device **106** typically includes one or more user applications, such as a web browser, to facilitate the sending and receiving of data over the network **102**.

A user device **106** can request resources **105** from a website **104**. In turn, data representing the resource **105** can be provided to the user device **106** for presentation by the user device **106**. The data representing the resource **105** can also include data specifying a portion of the resource or a portion of a user display, such as a presentation location of a pop-up window or a slot of a third-party content site or webpage, in which content can be presented. These specified portions of the resource or user display are referred to as slots (e.g., ad slots).

To facilitate searching of these resources, the environment **100** can include a search system **112** that identifies the resources by crawling and indexing the resources provided by the content publishers on the websites **104**. Data about the resources can be indexed based on the resource to which the data corresponds. The indexed and, optionally, cached copies of the resources can be stored in an indexed cache **114**.

User devices **106** can submit search queries **116** to the search system **112** over the network **102**. In response, the search system **112** can, for example, access the indexed cache **114** to identify resources that are relevant to the search query **116**. The search system **112** identifies the resources in the form of search results **118** and returns the search results **118** to the user devices **106** in search results pages. A search result **118** can be data generated by the search system **112** that identifies a resource that is provided in response to a particular search query, and includes a link to the resource. Search results pages can also include one or more slots in which other content items (e.g., advertisements) can be presented.

When a resource **105**, search results **118** and/or other content (e.g., a video) are requested by a user device **106**, the content management system **110** receives a request for content. The request for content can include characteristics of the slots that are defined for the requested resource or search results page, and can be provided to the content management system **110**.

For example, a reference (e.g., URL) to the resource for which the slot is defined, a size of the slot, and/or media types that are available for presentation in the slot can be provided to the content management system **110** in association with a given request. Similarly, keywords associated with a requested resource ("resource keywords") or a search query **116** for which search results are requested can also be pro-

vided to the content management system **110** to facilitate identification of content that is relevant to the resource or search query **116**.

Based at least in part on data included in the request, the content management system **110** can select content that is eligible to be provided in response to the request ("eligible content items"). For example, eligible content items can include eligible ads having characteristics matching the characteristics of ad slots and that are identified as relevant to specified resource keywords or search queries **116**. In addition, when no search is performed or no keywords are available (e.g., because the user is not browsing a webpage), other information, such as information obtained from one or more snapshots, can be used to respond to the received request. In some implementations, the selection of the eligible content items can further depend on user signals, such as demographic signals, behavioral signals or other signals derived from a user profile.

The content management system **110** can select from the eligible content items that are to be provided for presentation in slots of a resource or search results page based at least in part on results of an auction (or by some other selection process). For example, for the eligible content items, the content management system **110** can receive offers from content sponsors **108** and allocate the slots, based at least in part on the received offers (e.g., based on the highest bidders at the conclusion of the auction or based on other criteria, such as those related to satisfying open reservations and a value of learning). The offers represent the amounts that the content sponsors are willing to pay for presentation of (or selection of or other interaction with) their content with a resource or search results page. For example, an offer can specify an amount that a content sponsor is willing to pay for each 1000 impressions (i.e., presentations) of the content item, referred to as a CPM bid. Alternatively, the offer can specify an amount that the content sponsor is willing to pay (e.g., a cost per engagement) for a selection (i.e., a click-through) of the content item or a conversion following selection of the content item. For example, the selected content item can be determined based on the offers alone, or based on the offers of each content sponsor being multiplied by one or more factors, such as quality scores derived from content performance, landing page scores, a value of learning, and/or other factors.

A conversion can be said to occur when a user performs a particular transaction or action related to a content item provided with a resource or search results page. What constitutes a conversion may vary from case-to-case and can be determined in a variety of ways. For example, a conversion may occur when a user clicks on a content item (e.g., an ad), is referred to a webpage, and consummates a purchase there before leaving that webpage. A conversion can also be defined by a content provider to be any measurable or observable user action, such as downloading a white paper, navigating to at least a given depth of a website, viewing at least a certain number of webpages, spending at least a predetermined amount of time on a web site or webpage, registering on a website, experiencing media, or performing a social action regarding a content item (e.g., an ad), such as endorsing, republishing or sharing the content item. Other actions that constitute a conversion can also be used.

FIG. **2** shows an example system **200** for associating received requests from users with a particular confirmed location of a user identifier. For example, a user identifier associated with a first user **202***a* can be associated with a confirmed location **208**, e.g., the user's user-identified workplace. Confirmation can occur, for example, after repeated occurrences of use, by the first user **202***a*, of a wireless network **217**, e.g., WiFi with service set identifier (SSID) "A" that is located at the user's workplace. Requests **218** that are received from user devices **106***b* (e.g., associated with other users **202***b*) can also be associated with the same confirmed location **208**. Associations that are made can be based, for example, on characteristics **220** received with the requests **218** that match environment characteristics **216** received with location information **214**. In some implementations, the following example stages can be used for making the associations.

At stage 1, for example, the location association engine **122** can receive a user identifier associated with the first user **202***a*. User identification **204** can include, for example, receiving a user identifier that is obtained when the first user **202***a* uses an application running on the user device **106***a*, through a user login service, a social network, or in some other way.

At stage 2a, for example, the location association engine **122** can receive location information **206** associated with the received user identifier (e.g., associated with first user **202***a*). For example, user device location data can be determined based on location information derived from, or provided by, a user device associated with the received user identifier. At stage 2b, for example, the location information can be confirmed (**207**) by the first user **202***a*, either explicitly or implicitly. For example, the first user **202***a* may be prompted to confirm the location information (e.g., "is this your home or work or other location?"). The location information can be confirmed implicitly, such as by evaluating other known data about the user identifier (e.g., evaluate stored data for a work address for the user and compare it to GPS information received from the user device associated with the first user **202***a* to confirm the first user **202***a* is at a work location). For example, the confirmed location **208** (e.g., a building) can be identified by the first user **202***a*, such as by identifying a physical address (e.g., a street address) that is associated with the user's workplace. A location confirmation **207** can also include information that identifies the location's type (e.g., a work location), such as if the first user **202***a* indicates that the user device **106***a* is situated at the user's workplace (e.g., the confirmed location **208**). In some implementations, the location can be determined using, e.g., global positioning system (GPS) capabilities of the user device **106***a*, location identification based on cell phone towers, or in some other way. In some implementations, identification of the location type can be inferred, e.g., based on other inputs received from the user. In some implementations, information that associates a user identifier to an identified location can be stored in the data store of location associations **132**.

At stage 3, for example, the device location engine **124** can process device location data **210** associated with the user device **106***a*. Processing can occur, for example, subsequent to confirmation of the location. For example, the device location engine **124** can determine that the user device **106***a* is in a vicinity **212** of a confirmed location **208**. For example, the user device **106***a* can be networked through a WiFi network of the user's workplace, and the vicinity **212** can correspond to an area that includes the range of the WiFi signal. Determining that the user device **106***a* is in the vicinity **212** can also include determining that a signal strength included in the device location data **210** meets a minimum threshold signal strength. In some implementations, the vicinity **212** can be defined to exclude areas that are also in common with other WiFi networks, such as at a neighboring building or business. In some implementations, determining the location of a user device associated with the first user **202***a* and the vicinity **212** can depend on a WiFi signal that has a strong or stronger signal in relation to other WiFi signals in a same area. In some

implementations, device location information, including associations with confirmed locations, can be stored in the data store of device locations **134**.

At stage 4, for example, the location determination engine **126** can use location information **214** processed from the user device **106***a* to confirm that a sufficient number of occurrences have been identified of a presence of a device associated with the user identifier in the vicinity **212** of the confirmed location **208**. The location determination engine **126** can also receive or determine environment characteristics **216** in association with the location information **214**, e.g., a common wireless network **217** having a particular network identifier (e.g., a WiFi with SSID identifier "A"). For example, the sufficient number of occurrences (e.g., 10) can indicate, e.g., with a relative degree of certainty, that the user's confirmed location **208** is correct, in part because of repeated use of the same wireless network **217**. In some implementations, the environment characteristics **216** can include other characteristics (e.g., in addition to WiFi-related information) associated with the confirmed location **208** and the vicinity **212**. The other characteristics can include, for example, the type of location of the confirmed location **208** and surrounding features (e.g., being near a lake, a mall, public transport, or on a ground floor vs. an upper floor in a high-rise building). In some implementations, information indicating that a user has been confirmed to be present at a particular location (e.g., the confirmed location **208**) can be stored in the data store of confirmed locations **136**.

At stage 5, for example, the location determination engine **126** can store the one or more characteristics of the environment in association with the confirmed location **208**. For example, characteristics stored in the data store of environment characteristics **138** can include information associated with the WiFi or other signal(s), including a signal strength, wireless network identifier information, and other information associated with the environment.

At stage 6, for example, the content management system **110** can receive requests **218** from user devices **106***b* associated with the first user **202***a* or other users **202***b*. The location determination engine **126**, for example, can compare the stored one or more characteristics **138** with one or more characteristics of a subsequent request **218** from a user device associated with another user identifier. For example, requests **218** that are received can include characteristics **220** that, among other things, identify the same network identifier (e.g., the particular WiFi SSID "A") for the wireless network **217** associated with each request **218**. In some implementations, the requests **218** can be requests to fill content item slots (e.g., ad slots) on resources (e.g., web pages) displayed on the user devices **106***b*.

At stage 7, for example, when the comparing indicates a match, the location determination engine **126** can associate the confirmed location **208** with the subsequent request **218**. For example, characteristics **220** associated with each of the requests **218** can be compared to the environment characteristics **216** stored in the environment characteristics **138** that are stored in association with the confirmed location **208**. When matches are detected by the location determination engine **126**, for example, each corresponding request **218** can be associated **222** with the confirmed location **208**. Information for the matches can be stored, for example, in the data store of confirmed locations **136**. This information can be used, for example, when selecting content to be provided in response to the requests **218**. For example, a user may be an employee of a given company with a physical brick-and-mortar location (e.g., a salesman at a car dealership). The user may be confirmed as being associated with the physical brick-and-mortar location, such as after a series of occurrences in which the user has used a WiFi network at the brick-and-mortar location. Environment information associated with the brick-and-mortar location can be stored, e.g., in the data store of environment characteristics **138**. Subsequently, when other users access the same WiFi network, the other users can be associated with having a confirmed location **208** associated with the brick-and-mortar location. Determining this association can be useful, for example, in situations where the brick-and-mortar location may have insufficient GPS coverage, such as inside a large building or in a mall. In some implementations, content (e.g., an advertisement for the car dealership) can be selected based on the determining that the other users are in proximity to the confirmed location **208**.

FIG. **3** is a flowchart of an example process **300** for associating received requests from users with a particular confirmed location of a user identifier. In some implementations, the content management system **110** can perform steps of the process **300** using instructions that are executed by one or more processors. FIGS. **1-2** are used to provide example structures for performing the steps of the process **300**.

A user identifier associated with a user is received (**302**). As an example, the location association engine **122** can identify an identifier associated with the first user **202***a* when user identification **204** is received, e.g., when the first user **202***a* uses an application running on the user device **106***a*, a user login service, a social network, or in some other way.

A first confirmation of a location associated with the user identifier is received, including identifying a confirmed location (**304**). The confirmed location includes a physical address that is associated with the user identifier, and receiving the first confirmation includes receiving a type of location (**304**). The location association engine **122**, for example, can receive the location confirmation **207** that is associated with a user identifier associated with the first user **202***a*. For example, the confirmed location **208** (e.g., a building) can be explicitly identified by the first user **202***a*, such as by providing a physical address (e.g., a street address) that is associated with the user's current location along with a designation of a type of location (e.g., workplace). The confirmed location can be implicitly provided, such as by comparing previously-stored information with current location information (such as provided by a positioning system or other reference source). Information that associates a user identifier to an identified location can be stored, for example, in the data store of location associations **132**.

In some implementations, receiving the first confirmation of the location can include receiving confirmation of a first location, and the type of location can be a work location. For example, the location confirmation **207** can include information that identifies the location's type (e.g., a work location), such as if the first user **202***a* indicates that the user device **106***a* is situated at the user's workplace (e.g., the confirmed location **208**).

In some implementations, receiving the first confirmation of the location can include receiving confirmation of a second different location, and the type of location can be a home location. For example, instead of identifying the work location, the location confirmation **207** can include information that identifies the location's type as a home location for the first user **202***a*, e.g., if the confirmed location **208** is the user's home.

In some implementations, associating the confirmed location can further include using the confirmed location for selecting content to provide in response to the subsequent request. The content management system **110**, for example, can select content items (e.g., advertisements) responsive to

requests for content that are received from the user device **106***a*. Selecting content can be based, at least in part, on the confirmed location **208** associated with a user identifier associated with the first user **202***a*.

Subsequent to receiving the first confirmation, location data associated with a user device associated with the user identifier is processed (**306**). The device location engine **124**, for example, can process the device location data **210** associated with the user device **106***a*, e.g., subsequent to user identification **204** and location confirmation **207**. Processing the device location data **210** can include determining, for example, that the user device **106***a* is networked through the wireless network **217** of the user's workplace, e.g., within the vicinity **212** that corresponds to an area that includes the range of a WiFi signal associated with the wireless network **217**.

A second confirmation is performed, including confirming, based on the processing, that a sufficient number of occurrences have been identified of a presence of a device associated with the user identifier in the vicinity of the confirmed location, including determining one or more characteristics of an environment accessed by the user in association with a presence at a confirmed location (**308**). As an example, the location determination engine **126** can use location information **214** processed from the user device **106***a* to confirm that a sufficient number of occurrences have been identified of a presence of the first user **202***a* in the vicinity **212** of the confirmed location **208**. There can be a separate set of location information **214** that is received, for example, each time the first user **202***a* is in the vicinity **212**.

One or more characteristics of an environment accessed by the user are determined in association with a presence at a confirmed location (**309**). For example, the location determination engine **126** can also receive or determine environment characteristics **216** in association with the location information **214**, e.g., a common wireless network **217** having network identifier or SSID identifier "A". Each of the occurrences can be used to indicate, e.g., that the user's confirmed location **208** is correct, in part because of repeated use of the same wireless network **217**. In some implementations, information indicating that a user has been confirmed to be present at a particular location (e.g., the confirmed location **208**) can be stored in the data store of confirmed locations **136**.

In some implementations, confirming a sufficient number of occurrences can include determining a plurality of occurrences of the presence of the user are received from a location in the vicinity to the confirmed location based on a network identifier for a wireless network and one or more network signal quality metrics associated with a received request. For example, the location determination engine **126** can track and count the number of times that location information **214** indicates that the first user **202***a* has used the wireless network **217** with a signal quality metric (e.g., signal strength) above a pre-determined level, and the count can be used to confirm the sufficient number of occurrences. In some implementations, the network identifier can be a wireless network identifier information. In some implementations, network identifiers can include particular SSIDs, media access control (MAC) addresses, or other identifiers.

In some implementations, the second confirmation can include determining signal strength of a wireless signal associated with a signal that includes the location data, comparing the signal strength to a threshold, and when the signal strength exceeds the threshold, a network identifier for the wireless network associated with wireless signal can be stored in association with the confirmed location. For example, the location determination engine **126** can determine if the signal strength identified in the characteristics **220** is above a pre-determined threshold, e.g., that can indicate by a relative certainty that the signal is associated with the wireless network **217**. When the signal strength exceeds the threshold for a given request **218**, for example, the SSID "A" can be stored in association with the request.

The characteristics of the environment are stored in association with the confirmed location (**310**). As an example, the location determination engine **126** can store the environment characteristics **216**, in association with the confirmed location **208**, in the data store of environment characteristics **138**. The information that is stored can include, for example, information associated with a WiFi network or other signal(s), including a signal strength, wireless network identifier information, and other information associated with the environment.

Subsequent to the storing, requests are received from other users, including evaluating one or more characteristics of a given subsequent request and comparing the one or more characteristics of the subsequent request with the stored characteristics (**312**). The content management system **110**, for example, can receive requests **218** from user devices **106***b* associated with other users **202***b*. The location determination engine **126**, for example, can evaluate one or more characteristics **220** of a given subsequent request **218** and compare the one or more characteristics **220** with the environment characteristics **216** (of the confirmed location **208**) that are stored in the data store of environment characteristics **138**. For example, some or all of the requests **218** that are received can include characteristics **220** that identify, among other things, the same network identifier (e.g., the particular WiFi SSID "A") for the wireless network **217** associated with each request **218**.

When the comparing indicates a match, the confirmed location is associated with the subsequent request (**314**). For example, when the location determination engine **126** determines that a match exists between the characteristics **220** and the environment characteristics **216** for a particular request **218**, the location determination engine **126** can associate the confirmed location **208** with the particular request **218**. Information for the matches can be stored, for example, in the data store of confirmed locations **136**. This information can be used, for example, when selecting content to be provided in response to the requests **218**. For example, the content management system **110** can select content items (e.g., advertisements, offers, coupons, maps) that can be selected, at least in part, based on the confirmed location **208** associated with the requests **218**.

In some implementations, associating the confirmed location with the subsequent request can include identifying an entity (e.g., a business) associating with the confirmed location and associating the identified entity with the subsequent request. For example, the content management system **110** can determine the name of the business based on the confirmed location **208** and can use the information in selecting content that is more relevant to the other users **202***b*.

In some implementations, the entity can be a brick-and-mortar location associated with the entity. For example, the entity can be a physical building (or area) among one or more buildings (or areas) that are associated with a company, a business, a location, a municipality, or some other group or controlling interest.

FIG. **4** is a block diagram of example computing devices **400**, **450** that may be used to implement the systems and methods described in this document, as either a client or as a server or plurality of servers. Computing device **400** is intended to represent various forms of digital computers, such

as laptops, desktops, workstations, personal digital assistants, servers, blade servers, mainframes, and other appropriate computers. Computing device **400** is further intended to represent any other typically non-mobile devices, such as televisions or other electronic devices with one or more processors embedded therein or attached thereto. Computing device **450** is intended to represent various forms of mobile devices, such as personal digital assistants, cellular telephones, smartphones, and other computing devices. The components shown here, their connections and relationships, and their functions, are meant to be examples only, and are not meant to limit implementations of the inventions described and/or claimed in this document.

Computing device **400** includes a processor **402**, memory **404**, a storage device **406**, a high-speed controller **408** connecting to memory **404** and high-speed expansion ports **410**, and a low-speed controller **412** connecting to low-speed bus **414** and storage device **406**. Each of the components **402**, **404**, **406**, **408**, **410**, and **412**, are interconnected using various busses, and may be mounted on a common motherboard or in other manners as appropriate. The processor **402** can process instructions for execution within the computing device **400**, including instructions stored in the memory **404** or on the storage device **406** to display graphical information for a GUI on an external input/output device, such as display **416** coupled to high-speed controller **408**. In other implementations, multiple processors and/or multiple buses may be used, as appropriate, along with multiple memories and types of memory. Also, multiple computing devices **400** may be connected, with each device providing portions of the necessary operations (e.g., as a server bank, a group of blade servers, or a multi-processor system).

The memory **404** stores information within the computing device **400**. In one implementation, the memory **404** is a computer-readable medium. In one implementation, the memory **404** is a volatile memory unit or units. In another implementation, the memory **404** is a non-volatile memory unit or units.

The storage device **406** is capable of providing mass storage for the computing device **400**. In one implementation, the storage device **406** is a computer-readable medium. In various different implementations, the storage device **406** may be a floppy disk device, a hard disk device, an optical disk device, or a tape device, a flash memory or other similar solid state memory device, or an array of devices, including devices in a storage area network or other configurations. In one implementation, a computer program product is tangibly embodied in an information carrier. The computer program product contains instructions that, when executed, perform one or more methods, such as those described above. The information carrier is a computer- or machine-readable medium, such as the memory **404**, the storage device **406**, or memory on processor **402**.

The high-speed controller **408** manages bandwidth-intensive operations for the computing device **400**, while the low-speed controller **412** manages lower bandwidth-intensive operations. Such allocation of duties is an example only. In one implementation, the high-speed controller **408** is coupled to memory **404**, display **416** (e.g., through a graphics processor or accelerator), and to high-speed expansion ports **410**, which may accept various expansion cards (not shown). In the implementation, low-speed controller **412** is coupled to storage device **406** and low-speed bus **414**. The low-speed bus **414** (e.g., a low-speed expansion port), which may include various communication ports (e.g., USB, Bluetooth®, Ethernet, wireless Ethernet), may be coupled to one or more input/output devices, such as a keyboard, a pointing device, a scanner, or a networking device such as a switch or router, e.g., through a network adapter.

The computing device **400** may be implemented in a number of different forms, as shown in the figure. For example, it may be implemented as a standard server **420**, or multiple times in a group of such servers. It may also be implemented as part of a rack server system **424**. In addition, it may be implemented in a personal computer such as a laptop computer **422**. Alternatively, components from computing device **400** may be combined with other components in a mobile device (not shown), such as computing device **450**. Each of such devices may contain one or more of computing devices **400**, **450**, and an entire system may be made up of multiple computing devices **400**, **450** communicating with each other.

Computing device **450** includes a processor **452**, memory **464**, an input/output device such as a display **454**, a communication interface **466**, and a transceiver **468**, among other components. The computing device **450** may also be provided with a storage device, such as a micro-drive or other device, to provide additional storage. Each of the components **450**, **452**, **464**, **454**, **466**, and **468**, are interconnected using various buses, and several of the components may be mounted on a common motherboard or in other manners as appropriate.

The processor **452** can process instructions for execution within the computing device **450**, including instructions stored in the memory **464**. The processor may also include separate analog and digital processors. The processor may provide, for example, for coordination of the other components of the computing device **450**, such as control of user interfaces, applications run by computing device **450**, and wireless communication by computing device **450**.

Processor **452** may communicate with a user through control interface **458** and display interface **456** coupled to a display **454**. The display **454** may be, for example, a TFT LCD display or an OLED display, or other appropriate display technology. The display interface **456** may comprise appropriate circuitry for driving the display **454** to present graphical and other information to a user. The control interface **458** may receive commands from a user and convert them for submission to the processor **452**. In addition, an external interface **462** may be provided in communication with processor **452**, so as to enable near area communication of computing device **450** with other devices. External interface **462** may provide, for example, for wired communication (e.g., via a docking procedure) or for wireless communication (e.g., via Bluetooth® or other such technologies).

The memory **464** stores information within the computing device **450**. In one implementation, the memory **464** is a computer-readable medium. In one implementation, the memory **464** is a volatile memory unit or units. In another implementation, the memory **464** is a non-volatile memory unit or units. Expansion memory **474** may also be provided and connected to computing device **450** through expansion interface **472**, which may include, for example, a subscriber identification module (SIM) card interface. Such expansion memory **474** may provide extra storage space for computing device **450**, or may also store applications or other information for computing device **450**. Specifically, expansion memory **474** may include instructions to carry out or supplement the processes described above, and may include secure information also. Thus, for example, expansion memory **474** may be provide as a security module for computing device **450**, and may be programmed with instructions that permit secure use of computing device **450**. In addition, secure applications may be provided via the SIM cards, along with addi-

tional information, such as placing identifying information on the SIM card in a non-hackable manner.

The memory may include for example, flash memory and/or MRAM memory, as discussed below. In one implementation, a computer program product is tangibly embodied in an information carrier. The computer program product contains instructions that, when executed, perform one or more methods, such as those described above. The information carrier is a computer- or machine-readable medium, such as the memory **464**, expansion memory **474**, or memory on processor **452**.

Computing device **450** may communicate wirelessly through communication interface **466**, which may include digital signal processing circuitry where necessary. Communication interface **466** may provide for communications under various modes or protocols, such as GSM voice calls, SMS, EMS, or MMS messaging, CDMA, TDMA, PDC, WCDMA, CDMA2000, or GPRS, among others. Such communication may occur, for example, through transceiver **468** (e.g., a radio-frequency transceiver). In addition, short-range communication may occur, such as using a Bluetooth®, WiFi, or other such transceiver (not shown). In addition, GPS receiver module **470** may provide additional wireless data to computing device **450**, which may be used as appropriate by applications running on computing device **450**.

Computing device **450** may also communicate audibly using audio codec **460**, which may receive spoken information from a user and convert it to usable digital information. Audio codec **460** may likewise generate audible sound for a user, such as through a speaker, e.g., in a handset of computing device **450**. Such sound may include sound from voice telephone calls, may include recorded sound (e.g., voice messages, music files, etc.) and may also include sound generated by applications operating on computing device **450**.

The computing device **450** may be implemented in a number of different forms, as shown in the figure. For example, it may be implemented as a cellular telephone **480**. It may also be implemented as part of a smartphone **482**, personal digital assistant, or other mobile device.

Various implementations of the systems and techniques described here can be realized in digital electronic circuitry, integrated circuitry, specially designed ASICs (application specific integrated circuits), computer hardware, firmware, software, and/or combinations thereof. These various implementations can include implementation in one or more computer programs that are executable and/or interpretable on a programmable system including at least one programmable processor, which may be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least one input device, and at least one output device.

These computer programs (also known as programs, software, software applications or code) include machine instructions for a programmable processor, and can be implemented in a high-level procedural and/or object-oriented programming language, and/or in assembly/machine language. Other programming paradigms can be used, e.g., functional programming, logical programming, or other programming. As used herein, the terms "machine-readable medium" "computer-readable medium" refers to any computer program product, apparatus and/or device (e.g., magnetic discs, optical disks, memory, Programmable Logic Devices (PLDs)) used to provide machine instructions and/or data to a programmable processor, including a machine-readable medium that receives machine instructions as a machine-readable signal. The term "machine-readable signal" refers to any signal used to provide machine instructions and/or data to a programmable processor.

To provide for interaction with a user, the systems and techniques described here can be implemented on a computer having a display device (e.g., a CRT (cathode ray tube) or LCD (liquid crystal display) monitor) for displaying information to the user and a keyboard and a pointing device (e.g., a mouse or a trackball) by which the user can provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback (e.g., visual feedback, auditory feedback, or tactile feedback); and input from the user can be received in any form, including acoustic, speech, or tactile input.

The systems and techniques described here can be implemented in a computing system that includes a back end component (e.g., as a data server), or that includes a middleware component (e.g., an application server), or that includes a front end component (e.g., a client computer having a graphical user interface or a Web browser through which a user can interact with an implementation of the systems and techniques described here), or any combination of such back end, middleware, or front end components. The components of the system can be interconnected by any form or medium of digital data communication (e.g., a communication network). Examples of communication networks include a local area network ("LAN"), a wide area network ("WAN"), and the Internet.

The computing system can include clients and servers. A client and server are generally remote from each other and typically interact through a communication network. The relationship of client and server arises by virtue of computer programs running on the respective computers and having a client-server relationship to each other.

While this specification contains many specific implementation details, these should not be construed as limitations on the scope of any inventions or of what may be claimed, but rather as descriptions of features specific to particular implementations of particular inventions. Certain features that are described in this specification in the context of separate implementations can also be implemented in combination in a single implementation. Conversely, various features that are described in the context of a single implementation can also be implemented in multiple implementations separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a subcombination or variation of a subcombination.

Similarly, while operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Moreover, the separation of various system components in the implementations described above should not be understood as requiring such separation in all implementations, and it should be understood that the described program components and systems can generally be integrated together in a single software product or packaged into multiple software products.

Thus, particular implementations of the subject matter have been described. Other implementations are within the scope of the following claims. In some cases, the actions

recited in the claims can be performed in a different order and still achieve desirable results. In addition, the processes depicted in the accompanying figures do not necessarily require the particular order shown, or sequential order, to achieve desirable results. In certain implementations, multitasking and parallel processing may be advantageous.

What is claimed is:

1. A computer-implemented method comprising:

receiving an identifier associated with an electronic device;

receiving a first confirmation of a location associated with the identifier including identifying a confirmed location, wherein the confirmed location includes a physical address that is associated with the identifier, and wherein receiving the first confirmation includes receiving a type of location;

subsequent to receiving the first confirmation, processing location data associated with the electronic device associated with the identifier, the processing including determining that the electronic device is in a vicinity of the confirmed location;

performing, using one or more processors, a second confirmation including, based on the processing, confirming that a number of occurrences have been identified of a presence of the electronic device associated with the identifier in the vicinity of the confirmed location;

determining one or more characteristics of an environment accessed by the electronic device in association with the presence at the confirmed location;

storing the one or more characteristics of the environment in association with the confirmed location;

subsequent to the storing, comparing the stored one or more characteristics with one or more characteristics of a subsequent request from a second electronic device associated with another identifier to determine a match between the stored one or more characteristics and the one or more characteristics of the subsequent request; and

responsive to the comparing indicating the match, associating the confirmed location with the subsequent request.

2. The method of claim **1** wherein processing location data includes receiving location data from the electronic device with a user logged in, and wherein the location data is received through a wireless network.

3. The method of claim **2**, comprising determining a plurality of occurrences of the presence of the electronic device are received from a location in the vicinity of the confirmed location based on a network identifier for the wireless network and one or more network signal quality metrics associated with a received request.

4. The method of claim **3** wherein the network identifier is a service set identifier (SSID) or a media access control (MAC) address, and wherein the one or more network signal quality metrics include a signal strength.

5. The method of claim **1** wherein determining the one or more characteristics includes identifying signal strength and wireless network identifier information.

6. The method of claim **1** wherein associating the confirmed location further comprises using the confirmed location for selecting content to provide in response to the subsequent request.

7. The method of claim **1** wherein the second confirmation includes determining signal strength of a wireless signal associated with a signal that includes the location data, comparing the signal strength to a threshold, and when the signal strength exceeds the threshold, storing a network identifier for a wireless network associated with wireless signal in association with the confirmed location.

8. The method of claim **1** wherein storing the characteristics includes storing a confirmed location and a network identifier for a wireless network.

9. The method of claim **1** wherein associating the confirmed location with the subsequent request includes identifying an entity associating with the confirmed location and associating the identified entity with the subsequent request.

10. The method of claim **9** wherein the entity is a business and the confirmed location is a brick-and-mortar location associated with the entity.

11. A computer program product embodied in a non-transitory computer-readable medium including instructions, that when executed, cause one or more processors to:

receive an identifier associated with an electronic device;

receive a first confirmation of a location associated with the identifier including identifying a confirmed location, wherein the confirmed location includes a physical address that is associated with the identifier, and to receive a type of location;

responsive to the first confirmation, process location data associated with the electronic device associated with the identifier, to determine that the electronic device is in a vicinity of the confirmed location;

perform a second confirmation including, based on the processing, confirming that a number of occurrences have been identified of a presence of the electronic device associated with the identifier in the vicinity of the confirmed location;

determine one or more characteristics of an environment accessed by the electronic device in association with the presence at the confirmed location;

store the one or more characteristics of the environment in association with the confirmed location;

subsequent to storage of the one or more characteristics of the environment, compare the stored one or more characteristics with one or more characteristics of a subsequent request from a second electronic device associated with another identifier to determine a match between the stored one or more characteristics and the one or more characteristics of the subsequent request; and

responsive to the match, associate the confirmed location with the subsequent request.

12. The computer program product of claim **11** wherein processing location data includes receiving location data from the electronic device with a user logged in, and wherein the location data is received through a wireless network.

13. The computer program product of claim **12**, comprising the one or more processors configured to determine a plurality of occurrences of the presence of the electronic device associated with a location in the vicinity of the confirmed location based on a network identifier for the wireless network and one or more network signal quality metrics associated with a received request.

14. The computer program product of claim **13** wherein the network identifier is a service set identifier (SSID) or a media access control (MAC) address, and wherein the one or more network signal quality metrics include a signal strength.

15. The computer program product of claim **11** wherein the one or more processors are configured to use the confirmed location to select content to provide in response to the subsequent request.

16. A system, comprising:

one or more processors; and

one or more memory elements including instructions that, when executed, cause the one or more processors to:

receive an identifier associated with an electronic device;

receive a first confirmation of a location associated with the identifier including a confirmed location, wherein the confirmed location includes a physical address that is associated with the identifier, and to receive a type of location;

process location data associated with the electronic device associated with the identifier, and to determine that the electronic device is in a vicinity of the confirmed location;

perform a second confirmation based on the processing to confirm that a number of occurrences have been identified of a presence of a device associated with the identifier in the vicinity of the confirmed location;

determine one or more characteristics of an environment accessed by the electronic device in association with the presence at the confirmed location;

store the one or more characteristics of the environment in association with the confirmed location;

subsequent to the one or more characteristics of the environment stored in association with the confirmed location, compare the stored one or more characteristics with one or more characteristics of a subsequent request from a second electronic device associated with another identifier to determine a match between the stored one or more characteristics and the one or more characteristics of the subsequent request; and

responsive to the match, associate the confirmed location with the subsequent request.

17. The system of claim 16 wherein the one or more processors are configured to receive location data from the electronic device with a user is logged in, and wherein the location data is received through a wireless network.

18. The system of claim 17 wherein the one or more processors are configured to determine a plurality of occurrences of the presence of the electronic device are received from a location in the vicinity to the confirmed location based on a network identifier for the wireless network and one or more network signal quality metrics associated with a received request.

19. The system of claim 18 wherein the network identifier is a service set identifier (SSID) or a media access control (MAC) address, and wherein the one or more network signal quality metrics include a signal strength.

20. The system of claim 16 wherein the one or more processors are configured to use the confirmed location for selecting content to provide in response to the subsequent request.

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