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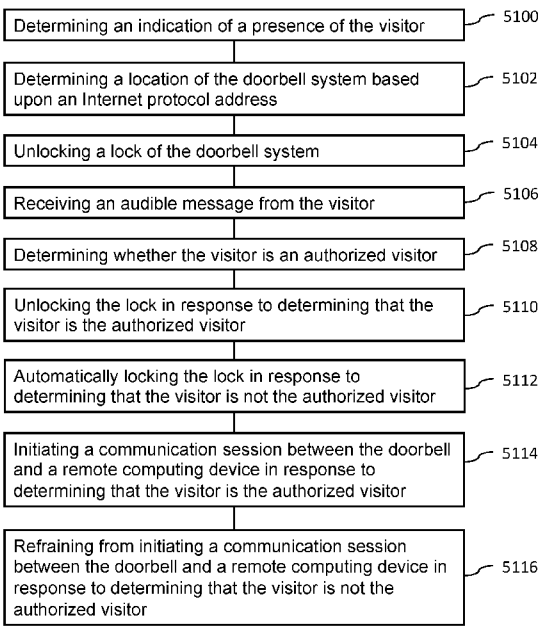


Figure 51

(57) Abstract: Communication systems can include a first device located near an entryway of a building and additional devices located inside the building. Communication systems can enable people to communication via the devices and can also enable people located away from the building to communicate. Communication systems can enable a visitor who is seeking a person (that the visitor may think is inside the building) to communicate with the person even though the person is located away from the building.

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# DOORBELL COMMUNICATION SYSTEMS AND METHODS

## CROSS-REFERENCE TO RELATED APPLICATIONS

The entire contents of the following application are incorporated by reference herein: U.S. Provisional Patent Application No. 62/539,472; filed July 31, 2017; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 15/793,552; filed October 25, 2017; and entitled DOORBELL PACKAGE DETECTION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 15/785,605; filed October 17, 2017; and entitled DOORBELL PACKAGE DETECTION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Provisional Patent Application No. 62/571,465; filed October 12, 2017; and entitled DOORBELL PACKAGE DETECTION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 15/167,831; filed May 27, 2016; and entitled DOORBELL PACKAGE DETECTION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 15/130,883; filed April 15, 2016; and entitled SMART LOCK SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 15/008,304; filed January 27, 2016; and entitled DOORBELL PACKAGE DETECTION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 14/861,613; filed September 22, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 14/813,479; filed July 30, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 14/589,830; filed January 5, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 14/743,849; filed June 18, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following applications are incorporated by reference herein: U.S. Nonprovisional Patent Application No. 14/612,376; filed February 3, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; U.S. Nonprovisional Patent Application No. 14/502,601; filed September 30, 2014; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; U.S. Nonprovisional Patent Application No. 14/492,809; filed September 22, 2014; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; U.S. Nonprovisional Patent Application No. 14/275,811; filed May 12, 2014; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; U.S. Nonprovisional Patent Application No. 14/142,839; filed December 28, 2013; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; U.S. Nonprovisional Patent Application No. 14/099,888; filed December 6, 2013; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; and U.S. Nonprovisional Patent Application No. 14/098,772; filed December 6, 2013; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: International Application No. PCT/US14/47622; filed July 22, 2014 with the U.S. Patent and Trademark Office; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

The entire contents of the following application are incorporated by reference herein: International Application No. PCT/US14/53506; filed August 29, 2014 with the

U.S. Patent and Trademark Office; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS.

## BACKGROUND

### Field

Various embodiments disclosed herein relate to doorbells. Certain embodiments relate to communication between a person near a doorbell and a person in another location.

### Description of Related Art

Homes, offices, and other buildings sometimes include communication and surveillance systems to enable friendly visitors to summon occupants of the buildings and to deter unwanted visitors. Communication and surveillance systems can include video cameras and doorbells.

Doorbells can enable a person located outside of an entry point, such as a door, to alert a person inside of an entry point that someone outside would like to talk to someone inside. Doorbells sometimes include a button located near a door, such as a front door, side door, or back door of a home, office, dwelling, warehouse, building, or structure. Doorbells are sometimes used near a gate or some other entrance to a partially enclosed area. Pushing the doorbell sometimes causes a chime or other alerting sound to be emitted. In some cases, this alerting sound can typically be heard within a short distance from the entry point or sound source. For example, a homeowner located remotely from her home likely would not be able to hear the alerting sound, and thus, would not be aware that someone is ringing her doorbell. Thus, there is a need for devices and methods to alert remotely located individuals that someone seeks the attention of the homeowner, tenant, building guardian, or steward.

## SUMMARY

In some embodiments, a communication system is configured to be at least partially coupled to a building. The communication system can include a first communication device coupled to the building at a first location. The first

communication device can comprise a first speaker and a first microphone. The communication system can comprise a second communication device coupled to the building at a second location. The second communication device can comprise a second speaker and a second microphone. The first communication device and the second communication device can be communicatively coupled to enable a visitor located at the first location to talk with a first person at the second location. The communication system can comprise a third communication device that has a portion physically coupled to the first speaker and the first microphone. The portion can be electrically coupled to at least one printed circuit board of the first communication device such that the portion can receive data based on sound from the first microphone and can send data such that the first speaker emits sound based on the data from the portion. The portion can be electrically and communicatively coupled with other parts of the third communication device.

In some embodiments, the portion of the third communication device is not physically coupled with at least some parts of the third communication device but is wirelessly communicatively coupled with other parts of the third communication device. The third communication device can be communicatively coupled to a first remote computing device via wireless communication.

In several embodiments, the third communication device is configured to receive a first audio data recorded by the first remote computing device, and/or the portion of the third communication device is configured to deliver the first audio data to the first speaker via a first electrical connection such that the first speaker emits a first sound based on the first audio data.

In some embodiments, the third communication device is configured to receive a second audio data recorded by the first communication device. The portion of the third communication device can be configured to receive the second audio data from the first microphone via a second electrical connection. The third communication device can be configured to send the second audio data to the first remote computing device such that the first remote computing device emits a second sound based on the second audio data.

In several embodiments, the first communication device comprises a first camera, the third communication device is configured to receive a first video data recorded by the

first camera, the portion of the third communication device is configured to receive the first video data via a third electrical connection, and/or the third communication device is configured to wirelessly send the first video data to the first remote computing device such that the first remote computing device displays a first video based on the first video data.

In some embodiments, the first communication device and the third communication device are located in an entryway of the building. The entryway can be an area near a door of the building or a gate configured to guard an exterior area of the building (e.g., a front yard or a communal area outside of an apartment complex). The second communication device can be located in a dwelling unit inside the building. The system can be configured to send a first alert regarding the visitor to the second communication device. The system can be configured to send a second alert regarding the visitor to the first remote computing device. In several embodiments, these alerts are sent simultaneously and/or within thirty seconds of each other. The alert signals can be continuous or intermittent. The alerts can comprise information regarding the visitor (e.g., an identity of the visitor, the purpose of the visit, an identify of a person with whom the visitor wishes to speak, a time of the visit, package information). An alert sent to a smartphone can be a push notification. The push notification can cause the smartphone to display a message to a user of the smartphone and/or can cause an “app” to open on the smartphone. An alert sent to a second communication device can cause a message to display on a display screen of the second communication device and/or can cause the second communication device to emit a notification sound (e.g., a ringing sound configured to get the attention of an occupant of an apartment, hotel room, or other dwelling unit).

In several embodiments, the system is configured to terminate the first alert in response to detecting that a second person responded to the second alert via the first remote computing device.

In some embodiments, the system is configured to send a first alert regarding the visitor to the second communication device, the system is configured to send a second alert regarding the visitor to the first remote computing device, and/or the system is

configured to terminate the second alert in response to detecting that the first person responded to the first alert via the second communication device.

In several embodiments, the second communication device is located in a dwelling unit inside the building. The system can be configured to send an alert regarding the visitor to the first remote computing device in response to detecting that the first remote computing device is not located in dwelling unit.

In some embodiments, the second communication device is located in a dwelling unit inside the building. The system can be configured to send an alert regarding the visitor to the first remote computing device in response to determining that the first person is not located in dwelling unit.

In several embodiments, the system comprises a fourth communication device coupled to the building at a third location. The fourth communication device can comprise a third speaker and a third microphone. The first communication device and the fourth communication device can be communicatively coupled to enable the visitor located at the first location to talk with a third person at the third location. The fourth communication device can be communicatively coupled to a second remote computing device via the first communication device and the third communication device.

In some embodiments, the third communication device is configured to enable two-way audio communication between the second remote computing device and the first communication device in response to at least one of the first communication device and the third communication device detecting that the visitor wishes to speak with at least one of a dwelling unit in which the fourth communication device is located and an occupant of the dwelling unit in which the fourth communication device is located.

This disclosure includes a doorbell system configured to be coupled to a building. The system may include a remote computing device and a doorbell coupled to the building and communicatively coupled to the remote computing device. The doorbell may comprise a camera configurable to capture images, a microphone configurable to receive audio, and a button configurable to be pressed by a visitor to notify an occupant of the building. The system may include a lock coupled to the building and communicatively coupled to at least one of the doorbell and the remote computing

device. The lock may be configurable to be locked and unlocked in response to an input received by the remote computing device.

In some embodiments, the building may be a multi-unit building and the lock may be a main lock coupled adjacent to a main entrance of the building. The system may further include a first lock coupled to a first door of a first apartment unit within the building and communicatively coupled to at least one of the doorbell and the remote computing device. The first lock may be configurable to be locked and unlocked in response to a second input received by the remote computing device.

The remote computing device may be a first remote computing device. The system may further include a second remote computing device communicatively coupled to the doorbell and a second lock coupled to a second door of a second apartment unit within the building and communicatively coupled to at least one of the doorbell and the second remote computing device. The second lock may be configurable to be locked and unlocked in response to a third input received by the second remote computing device.

In some embodiments, the system includes a remote server communicatively coupled to at least one of the remote computing device, the doorbell, the first lock, and the second lock. The server is configurable to store a plurality of Internet protocol addresses and thereby determine a location of the doorbell based upon an Internet protocol address of the doorbell. The server may further be configurable to store voice data and thereby determine an identity of the visitor based upon the audio received by the microphone.

The main lock may define a first form factor and the first lock may define a second form factor. In some embodiments, the first form factor and the second form factor are substantially identical. Even still, in some embodiments, the first form factor and the second form factor are different.

The doorbell system can be arranged and configured to capture facial recognition data and determine an identity of the visitor based on the facial recognition data. As well, the doorbell system can be arranged and configured to capture voice recognition data and determine an identity of the visitor based on the voice recognition data.

The disclosure also includes a method of using a doorbell system to enable an occupant to grant a visitor access to a building. The method can include determining, via

the doorbell system, an indication of a presence of the visitor. The method can also include determining, via a remote server communicatively coupled to the doorbell system, a location of the doorbell system based upon an Internet protocol address of the doorbell system. Additionally, the method can include unlocking a lock of the doorbell system.

Methods can include receiving, via a microphone of the doorbell system, an audible message from the visitor. Methods may also include determining whether the visitor is an authorized visitor. In some embodiments, methods include automatically unlocking the lock in response to determining that the visitor is the authorized visitor. Accordingly, methods may also include automatically locking the lock in response to determining that the visitor is not the authorized visitor.

In some embodiments, determining whether the visitor is the authorized visitor comprises determining an identity of the visitor. Additionally, in some embodiments, determining the identify of the visitor comprises capturing facial recognition data and determining the identify of the visitor via the facial recognition data. Determining the identity of the visitor may comprise capturing voice recognition data and determining the identity of the visitor via the voice recognition data.

Methods may include initiating a communication session between the doorbell and a remote computing device in response to determining that the visitor is the authorized visitor. Methods may also include refraining from initiating a communication session between the doorbell and a remote computing device in response to determining that the visitor is not the authorized visitor.

The disclosure also includes a method of using a doorbell system, comprising receiving a residence identification in response to a visitor initiating a first communication at a remote building having at least a first residence and a second residence. The method may also include selecting a first remote computing device associated with the first residence based on the residence identification, and sending a push notification to the first remote computing device in response to receiving the residence identification and selecting the remote computing device.

In some embodiments, methods include comprising receiving the residence identification in response to the visitor pressing a doorbell button to initiate the first

communication. Methods can also include receiving the first communication having an Internet protocol address associated with the remote building, identifying a first phone number of the first remote computing device in response to analyzing the Internet protocol address, and sending the push notification to the first phone number.

Even still, methods may include receiving permission from the first remote computing device to unlock an entrance to the remote building at least partially in response to sending an audio message from the visitor to the first remote computing device, and unlocking the entrance. Methods may even include unlocking a door of the first residence in response to receiving the permission.

In some embodiments, methods include receiving the residence identification having a physical address of the remote building, determining that the visitor wants access to the first residence in response to data received directly or indirectly from the visitor, identifying a first phone number associated with the first residence, and sending the push notification to the first phone number. Methods can include receiving permission from the first remote computing device to unlock an entrance to the remote building at least partially in response to sending an audio message from the visitor to the first remote computing device, and unlocking the entrance. Accordingly, methods may include unlocking a door of the first residence in response to receiving the permission.

Receiving the residence identification may comprise analyzing a recording of the visitor speaking to identify that the visitor wants access to the first residence. Methods may also include receiving a second phone number of a second remote computing device of the visitor at least partially in response to the visitor pressing a doorbell button to initiate the first communication, initiating a two-way audio communication between the second remote computing device of the visitor and the first remote computing device associated with the first residence, and receiving authorization from the first remote computing device at least partially in response to the two-way audio communication to send an electronic key data to the second remote computing device via an electronic communication sent via the second phone number.

In some embodiments, methods include receiving a second communication in response to a key identification system located at an entrance to the first residence sensing the electronic key data, and sending a third communication to unlock a door of

the first residence in response to receiving the second communication. In some embodiments, the electronic key data is a code configured to enable the visitor to unlock a door of the first residence for a temporary period of time.

Methods may also include unlocking a door of the first residence in response to a proximity sensor located at an entrance of the first residence detecting a second remote computing device of the visitor. In some embodiments, methods include unlocking a door of the first residence in response to a doorbell located at an entrance of the first residence recognizing at least one of a face of the visitor and a physical characteristic of the first visitor.

The embodiments described above include many optional features and aspects. Features and aspects of the embodiments can be combined.

## BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages are described below with reference to the drawings, which are intended to illustrate, but not to limit, the invention. In the drawings, like reference characters denote corresponding features consistently throughout similar embodiments.

Figure 1 illustrates a front view of a communication system, according to some embodiments.

Figure 2 illustrates a computing device running software, according to some embodiments.

Figure 3 illustrates an embodiment in which a security system is connected to a building, according to some embodiments.

Figure 4 illustrates a communication system that includes a security system, a doorbell button, a wireless router, a server, and users, according to some embodiments.

Figure 5 illustrates a flow diagram showing a method of operating a security system, according to some embodiments.

Figure 6 illustrates a flow diagram showing another method of operating a security system, according to some embodiments.

Figures 7, 8, 9 and 10 illustrate visitors being detected by security systems, according to various embodiments.

Figure 11 illustrates a block diagram of a security system that is communicatively coupled to a communication system, according to some embodiments.

Figure 12 illustrates a block diagram of various event detection devices that are communicatively coupled to a communication system, according to some embodiments.

Figure 13 illustrates a flowchart of a method of monitoring for an event through a communication system, according to some embodiments.

Figure 14 illustrates an example of various alarm types that may be used based on the certainty and severity of the event, according to some embodiments.

Figures 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 and 28 illustrate flow diagrams showing methods of operating a security system, according to various embodiments.

Figure 29 illustrates a back view of the doorbell from Figure 1 without a mounting bracket, according to some embodiments.

Figure 30 illustrates a diagrammatic view of a doorbell and a doorbell control software application running on a computing device, according to some embodiments.

Figure 31 illustrates a front view of a doorbell chime, according to some embodiments.

Figure 32 illustrates a side perspective view of a doorbell chime, according to some embodiments.

Figure 33 illustrates a front view of a doorbell chime coupled to a power outlet, according to some embodiments.

Figures 34, 35, and 36 illustrate diagrammatic views of doorbell systems, according to some embodiments.

Figure 37 illustrates a back view of a chime without a back cover to show various components of the chime's electrical system, according to some embodiments.

Figures 38, 39, 40, 41, 42, and 43 illustrate method flowcharts, according to some embodiments.

Figures 44 and 45 illustrate diagrammatic views of doorbell systems, according to some embodiments.

Figure 46 illustrates a front view of a doorbell, according to some embodiments.

Figure 47 illustrates a front view of a doorbell system, according to some embodiments.

Figure 48 illustrates a front view of another doorbell system, according to some embodiments.

Figures 49 and 50 illustrate a first form factor and a second form factor, according to some embodiments.

Figures 51, 52, 53, 54, 55, and 56 illustrate method flowcharts, according to some embodiments.

Figure 57 illustrates a diagrammatic view of a visitor trying to communicate with a person that is located inside a building, according to some embodiments.

Figure 58 illustrates a diagrammatic view of a visitor trying to communicate with a person, according to some embodiments.

Figure 59 illustrates a diagrammatic view of the system shown in Figure 57, according to some embodiments.

Figures 60 and 61 illustrate diagrammatic views of the system shown in Figure 58, according to some embodiments.

## DETAILED DESCRIPTION

Although certain embodiments and examples are disclosed below, inventive subject matter extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses, and to modifications and equivalents thereof. Thus, the scope of the claims appended hereto is not limited by any of the particular embodiments described below. For example, in any method or process disclosed herein, the acts or operations of the method or process may be performed in any suitable sequence and are not necessarily limited to any particular disclosed sequence. Various operations may be described as multiple discrete operations in turn, in a manner that may be helpful in understanding certain embodiments; however, the order of description should not be construed to imply that these operations are order dependent. Additionally, the structures, systems, and/or devices described herein may be embodied as integrated components or as separate components.

For purposes of comparing various embodiments, certain aspects and advantages of these embodiments are described. Not necessarily all such aspects or advantages are achieved by any particular embodiment. Thus, for example, various embodiments may be carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other aspects or advantages as may also be taught or suggested herein.

INTRODUCTION

Communication systems can provide a secure and convenient way for a remotely located individual to communicate with a person who is approaching a sensor, such as a proximity sensor or motion sensor, or with a person who rings a doorbell, which can be located in a doorway, near an entrance, or within 15 feet of a door. Some communication systems allow an individual to hear, see, and talk with visitors who approach at least a portion of the communication system and/or press a button, such as a doorbell's button. For example, communication systems can use a computing device to enable a remotely located person to see, hear, and/or talk with visitors. Computing devices can include computers, laptops, tablets, mobile devices, smartphones, cellular phones, and wireless devices (e.g., cars with wireless communication). Example computing devices include the iPhone, iPad, iMac, MacBook Air, and MacBook Pro made by Apple Inc. Communication between a remotely located person and a visitor can occur via the Internet, cellular networks, telecommunication networks, and wireless networks.

Figure 1 illustrates a front view of a communication system embodiment. The communication system 200 can include a security system 202 (e.g., a doorbell) and a computing device 204. Although the illustrated security system 202 includes many components in one housing, several security system embodiments include components in separate housings. The security system 202 can include a camera assembly 208 and a doorbell button 212. The camera assembly 208 can be a video camera, which in some embodiments is a webcam.

The security system 202 can include a diagnostic light 216 and a power indicator light 220. In some embodiments, the diagnostic light 216 is a first color (e.g., blue) if the security system 202 and/or the communication system 200 is connected to a wireless

Internet network and is a second color (e.g., red) if the security system 202 and/or the communication system 200 is not connected to a wireless Internet network. In some embodiments, the power indicator 220 is a first color if the security system 202 is connected to a power source. The power source can be power supplied by the building 300 to which the security system 202 is attached. In some embodiments, the power indicator 220 is a second color or does not emit light if the security system 202 is not connected to the power source.

The security system 202 (e.g., a doorbell) can receive power and/or information from an Ethernet cable 221 that can be electrically coupled to the doorbell. The Ethernet cable 221 can exit a hole in an exterior of a building near an entryway to enable electrically coupling the doorbell to the Ethernet cable 221.

As well, the security system 202 can include at least one speaker 488. The speaker 488 can be located along any portion of the security system 202. For example, the speaker 488 can be located within an inner portion of the security system 202 or along an outer portion of the security system 202. The speaker 488 can be any type of sound output device configured to emit sound, such as a digital speaker, an analog speaker, and the like.

Furthermore, the security system 202 (e.g., a doorbell) can include an outer housing 224, which can be water resistant and/or waterproof. The outer housing can be made from metal or plastic, such as molded plastic with a hardness of 60 Shore D. In some embodiments, the outer housing 224 is made from brushed nickel or aluminum.

Rubber seals can be used to make the outer housing 224 water resistant or waterproof. The security system 202 can be electrically coupled to a power source, such as wires electrically connected to a building's electrical power system. In some embodiments, the security system 202 includes a battery for backup and/or primary power.

Wireless communication 230 can enable the security system 202 (e.g., a doorbell) to communicate with the computing device 204. Some embodiments enable communication via cellular and/or WiFi networks. Some embodiments enable communication via the Internet. Several embodiments enable wired communication between the security system 202 and the computing device 204. The wireless

communication 230 can include the following communication means: radio, WiFi (e.g., wireless local area network), cellular, Internet, Bluetooth, telecommunication, electromagnetic, infrared, light, sonic, and microwave. Other communication means are used by some embodiments. In some embodiments, such as embodiments that include telecommunication or cellular communication means, the security system 202 can initiate voice calls or send text messages to a computing device 204 (e.g., a smartphone, a desktop computer, a tablet computer, a laptop computer).

Several embodiments use near field communication (NFC) to communicate between the computing device 204 and the doorbell 202. The doorbell 202 and/or the computing device 204 can include a NFC tag. Some NFC technologies include Bluetooth, radio-frequency identification, and QR codes.

Some embodiments include computer software (e.g., application software), which can be a mobile application designed to run on smartphones, tablet computers, and other mobile devices. Software of this nature is sometimes referred to as "app" software. Some embodiments include software designed to run on desktop computers and laptop computers.

The computing device 204 can run software with a graphical user interface. The user interface can include icons or buttons. In some embodiments, the software is configured for use with a touch-screen computing device such as a smartphone or tablet.

Figure 2 illustrates a computing device 204 running software. The software includes a user interface 240 displayed on a display screen 242. The user interface 240 can include a security system indicator 244, which can indicate the location of the security system that the user interface is displaying. For example, a person can use one computing device 204 to control and/or interact with multiple security systems, such as one security system located at a front door and another security system located at a back door. Selecting the security system indicator 244 can allow the user to choose another security system (e.g., the back door security system rather than the front door security system).

The user interface 240 can include a connectivity indicator 248. In some embodiments, the connectivity indicator can indicate whether the computing device is in communication with a security system, the Internet, and/or a cellular network. The

connectivity indicator 248 can alert the user if the computing device 204 has lost its connection with the security system 202; the security system 202 has been damaged; the security system 202 has been stolen; the security system 202 has been removed from its mounting location; the security system 202 lost electrical power; and/or if the computing device 204 cannot communicate with the security system 202. In some embodiments, the connectivity indicator 248 alerts the user of the computing device 204 by flashing, emitting a sound, displaying a message, and/or displaying a symbol.

In some embodiments, if the security system 202 loses power, loses connectivity to the computing device 204, loses connectivity to the Internet, and/or loses connectivity to a remote server, a remote server 206 sends an alert (e.g., phone call, text message, image on the user interface 240) regarding the power and/or connectivity issue. In several embodiments, the remote server 206 can manage communication between the security system 202 and the computing device. In some embodiments, information from the security system 202 is stored by the remote server 206. In several embodiments, information from the security system 202 is stored by the remote server 206 until the information can be sent to the computing device 204, uploaded to the computing device 204, and/or displayed to the remotely located person via the computing device 204. The remote server 206 can be a computing device that stores information from the security system 202 and/or from the computing device 204. In some embodiments, the remote server 206 is located in a data center.

In some embodiments, the computing device 204 and/or the remote server 206 attempts to communicate with the security system 202. If the computing device 204 and/or the remote server 206 is unable to communicate with the security system 202, the computing device 204 and/or the remote server 206 alerts the remotely located person via the software, phone, text, a displayed message, and/or a website. In some embodiments, the computing device 204 and/or the remote server 206 attempts to communicate with the security system 202 periodically; at least every five hours and/or less than every 10 minutes; at least every 24 hours and/or less than every 60 minutes; or at least every hour and/or less than every second.

In some embodiments, the server 206 can initiate communication to the computer device 204 and/or to the security system 202. In several embodiments, the server 206 can

initiate, control, and/or block communication between the computing device 204 and the security system 202.

In several embodiments, a user can log into an "app," website, and/or software on a computing device (e.g., mobile computing device, smartphone, tablet, desktop computer) to adjust the security system settings discussed herein.

In some embodiments, a computing device can enable a user to watch live video and/or hear live audio from a security system due to the user's request rather than due to actions of a visitor. Some embodiments include a computing device initiating a live video feed (or a video feed that is less than five minutes old).

In some embodiments, the user interface 240 displays an image 252 such as a still image or a video of an area near and/or in front of the security system 202. The image 252 can be taken by the camera assembly 208 and stored by the security system 202, server 206, and/or computing device 204. The user interface 240 can include a recording button 256 to enable a user to record images, videos, and/or sound from the camera assembly 208, microphone of the security system 202, and/or microphone of the computing device 204.

In several embodiments, the user interface 240 includes a picture button 260 to allow the user to take still pictures and/or videos of the area near and/or in front of the security system 202. The user interface 240 can also include a sound adjustment button 264 and a mute button 268. The user interface 240 can include camera manipulation buttons such as zoom, pan, and light adjustment buttons. In some embodiments, the camera assembly 208 automatically adjusts between Day Mode and Night Mode. Some embodiments include an infrared camera and/or infrared lights to illuminate an area near the security system 202 to enable the camera assembly 208 to provide sufficient visibility (even at night).

In some embodiments, buttons include diverse means of selecting various options, features, and functions. Buttons can be selected by mouse clicks, keyboard commands, and touching a touch screen. Many embodiments include buttons that can be selected without touch screens.

In some embodiments, the user interface 240 includes a quality selection button, which can allow a user to select the quality and/or amount of the data transmitted from

the security system 202 to the computing device 204 and/or from the computing device 204 to the security system 202.

In some embodiments, video can be sent to and/or received from the computing device 204 using video chat protocols such as FaceTime (by Apple Inc.) or Skype (by Microsoft Corporation). In some embodiments, these videos are played by videoconferencing apps on the computing device 204 instead of being played by the user interface 240.

The user interface 240 can include a termination button 276 to end communication between the security system 202 and the computing device 204. In some embodiments, the termination button 276 ends the ability of the person located near the security system 202 (i.e., the visitor) to hear and/or see the user of the computing device 204, but does not end the ability of the user of the computing device 204 to hear and/or see the person located near the security system 202.

In some embodiments, a button 276 is both an answer button (to accept a communication request from a visitor) and is a termination button (to end communication between the security system 202 and the computing device 204). The button 276 can include the word "Answer" when the system is attempting to establish two-way communication between the visitor and the user. Selecting the button 276 when the system is attempting to establish two-way communication between the visitor and the user can start two-way communication. The button 276 can include the words "End Call" during two-way communication between the visitor and the user. Selecting the button 276 during two-way communication between the visitor and the user can terminate two-way communication. In some embodiments, terminating two-way communication still enables the user to see and hear the visitor. In some embodiments, terminating two-way communication causes the computing device 204 to stop showing video from the security system and to stop emitting sounds recorded by the security system.

In some embodiments, the user interface 240 opens as soon as the security system detects a visitor (e.g., senses indications of a visitor). Once the user interface 240 opens, the user can see and/or hear the visitor even before "answering" or otherwise accepting two-way communication, in several embodiments.

Some method embodiments include detecting a visitor with a security system. The methods can include causing the user interface to display on a remote computing device 204 due to the detection of the visitor (e.g., with or without user interaction). The methods can include displaying video from the security system and/or audio from the security system before the user accepts two-way communication with the visitor. The methods can include displaying video from the security system and/or audio from the security system before the user accepts the visitor's communication request. The methods can include the computing device simultaneously asking the user if the user wants to accept (e.g., answer) the communication request and displaying audio and/or video of the visitor. For example, in some embodiments, the user can see and hear the visitor via the security system before opening a means of two-way communication with the visitor.

In some embodiments, the software includes means to start the video feed on demand. For example, a user of the computing device might wonder what is happening near the security system 202. The user can open the software application on the computing device 204 and instruct the application to show live video and/or audio from the security device 202 even if no event near the security system 202 has triggered the communication.

In several embodiments, the security device 202 can be configured to record when the security device 202 detects movement and/or the presence of a person. The user of the computing device 204 can later review all video and/or audio records when the security device 202 detected movement and/or the presence of a person.

Referring now to Figure 1, in some embodiments, the server 206 controls communication between the computing device 204 and the security system 202, which can be a doorbell with a camera, a microphone, and a speaker. In several embodiments, the server 206 does not control communication between the computing device 204 and the security system 202.

In some embodiments, data captured by the security system and/or the computing device 204 (such as videos, pictures, and audio) is stored by another remote device such as the server 206. Cloud storage, enterprise storage, and/or networked enterprise storage can be used to store video, pictures, and/or audio from the communication system 200 or from any part of the communication system 200. The user can download and/or stream

stored data and/or storage video, pictures, and/or audio. For example, a user can record visitors for a year and then later can review conversations with visitors from the last year. In some embodiments, remote storage, the server 206, the computing device 204, and/or the security system 202 can store information and statistics regarding visitors and usage.

Figure 3 illustrates an embodiment in which a doorbell 202 is connected to a building 300, which can include an entryway 310 that has a door 254. A visitor 388 can approach the doorbell 202 and then can be detected by the doorbell 202. The visitor 388 can press the doorbell button 212. The user of the doorbell 202 can configure the doorbell 202 such that when the visitor 388 presses the doorbell button 212, the user receives a notification regarding the visitor 388.

Electrical wires 304 can electrically couple the doorbell 202 to the electrical system of the building 300 such that the doorbell 202 can receive electrical power from the building 300. The building can include a door lock 250 to lock the door 254.

A wireless network 308 can allow devices to wirelessly access the Internet. The security system 202 can access the Internet via the wireless network 308. The wireless network 308 can transmit data from the security system 202 to the Internet, which can transmit the data to remotely located computing devices 204. The Internet and wireless networks can transmit data from remotely located computing devices 204 to the security system 202. In some embodiments, a security system 202 connects to a home's WiFi.

As illustrated in Figure 3, one computing device 204 (e.g., a laptop, a smartphone, a mobile computing device, a television) can communicate with multiple security systems 202. In some embodiments, multiple computing devices 204 can communicate with one security system 202.

In some embodiments, the security system 202 can communicate (e.g., wirelessly 230) with a television 306, which can be a smart television. Users can view the television 306 to see a visitor and/or talk with the visitor.

Figure 4 illustrates a communication system 310 that includes a security system 320, a doorbell button 212, a WiFi router 328, a server 332, and users 336. In step 340, a visitor initiates a communication request by pressing the doorbell button 212 or triggering a motion or proximity sensor. The visitor can trigger the motion or proximity sensor by approaching the security system 320. In step 350, the security system 320 connects or

otherwise communicates with a home WiFi router 328. In step 360, the server 332 receives a signal from the WiFi router 328 and sends video and/or audio to the users 336 via a wireless network 364. In step 370, the users see the visitor, hear the visitor, and talk with the visitor. Step 370 can include using a software application to see, hear, and/or talk with the visitor. The visitor and users 336 can engage in two-way communication 374 via the internet or other wireless communication system even when the visitor and the users 336 are located far away from each other. Some embodiments enable users to receive communication requests and communicate with visitors via diverse mobile communication standards including third generation ("3G"), fourth generation ("4G"), long term evolution ("LTE"), worldwide interoperability for microwave access ("WiMAX"), and WiFi.

In some cases, the users 336 utilize the communication system 310 to communicate with visitors who are in close proximity to the users 336. For example, a user 336 located inside her home can communicate with a visitor located just outside the home via the communication system 310.

Figure 29 illustrates an internal view of the doorbell 202. Doorbells 202 can include a chip 480 (e.g., integrated circuits, microprocessor, computer) and a memory 492. Doorbells 202 can also include a microphone 484 and a speaker 488. The speaker 488 can comprise a flat speaker and a sound chamber 460 configured to amplify an emitted sound. The flat speaker can be located in the sound chamber. Some doorbell embodiments include a proximity sensor 500. In several embodiments, doorbells 202 include a wireless communication module 504, such as a WiFi module. The communication module 504 can have an integrated antenna. In some embodiments, an antenna is contained within the outer housing 224.

The doorbell 202 can include one or more heating elements 508 configured to regulate the temperature of the doorbell 202. For example, doorbells 202 can be used in very cold environments, such as in Alaska. The heating element 508 can be used in various methods to protect temperature sensitive portions of the doorbell 202 from cold weather.

While protecting the doorbell 202 from cold weather can be important in some embodiments, protecting visitors from excessive heat can also be important in some

embodiments. Excessive heat could burn visitors as they "ring" the doorbell (e.g., press the doorbell button 212 shown in Figure 35). The doorbell 202 can include a thermometer 512 to enable the system to determine the temperature inside a portion of the doorbell 202 and/or outside the doorbell 202.

Several embodiments can be configured for 9 to 40 volts alternating current ("VAC") and/or 9 to 40 volts direct current ("VDC"). Some embodiments convert input electricity into direct current (DC), such as 12 VDC. Several embodiments include a converter 494 for power conversion (e.g., converting electrical energy from one form to another). The converter 494 can convert input power (e.g., from wiring in a building) to a suitable power form for the doorbell 202. The power conversion can convert between AC and DC, change the voltage, and/or change the frequency. The converter 494 can include a transformer and/or a voltage regulator. In several embodiments, the converter 494 can include a DC to DC converter, a voltage stabilizer, a linear regulator, a surge protector, a rectifier, a power supply unit, a switch, an inverter, and/or a voltage converter. In some embodiments, the converter 494 converts 50 Hertz ("Hz") power into 60 Hz power.

The electrical components of the doorbell 202 (e.g., the camera assembly 208, the memory 492, the chip 480, the speaker 488, the converter 494, the microphone 484, the lights 458, the rectifier 524, the proximity sensor 500, the communication module 504, the heating element 508, the electrical connectors 510, the thermometer 512, the image analysis system 520, and the battery 642) can be electrically coupled to a printed circuit board ("PCB") 516 and can receive electrical power from the PCB 516.

The PCB 516 and the electrical components of the doorbell 202 can be the electrical system 456 of the doorbell 202. Additional details regarding the PCB 516 and the electrical components of the doorbell 202 are described in U.S. Nonprovisional Patent Application No. 14/612,376; filed February 3, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS. The entire contents of Patent Application No. 14/612,376 are incorporated by reference herein.

Although some embodiments are described in the context of methods, the method embodiments can also be formulated as devices and systems. Methods described herein can be applied to the devices and systems incorporated by references herein.

VIDEO EMBODIMENTS

Referring now to Figures 1 and 2, software can start the video feed on demand. For example, a user of the computing device might wonder what is happening near the security system 202. The user can open the software application (e.g., an "app") on the computing device 204 and instruct the application to show live video and/or audio from the security device 202 even if no event near the security system 202 has triggered the communication.

Several embodiments include "on-demand" service. For example, a user can initiate communicate via a doorbell and/or can initiate live video from the doorbell by pressing a button 260 on a user interface (shown in Figure 2). Pressing the on-demand button 260 again can terminate the communication and/or the live video.

SITUATIONAL SOUND EMBODIMENTS

The security system 202 may be configured to play unique sounds in response to detecting specific situations and/or during certain times of day. The sounds may be preprogrammed sounds or completely customizable by a user of the security system 202. As well, the security system 202 may be configured to play any of the sounds according to specific situations. For example, the security system 202 may be configured to play a specific message for a specific visiting individual, and/or may be configured to play a specific message when a potential visitor is identified as a specific person or is included in a list of specific people.

The security system 202 may include a speaker 488 configured to emit any type of sound. The security system 202 may also include a visitor detection system that may include at least one of a button 212, a camera 208, and a motion detector 218. Accordingly, the visitor detection system may be configurable to receive various indications of a visitor's presence. As well, the speaker 488 and the visitor detection system may be directly or indirectly coupled to the security system 202. Even still, the speaker 488 and the visitor detection system may be mechanically, electrically, and/or communicatively coupled to the security system 202.

The security system 202 may detect different indications of a visitor's presence. As shown in Figure 5, the security system 202 can be configured to receive a first

indication of a visitor's presence (at step 560). In response to receiving the first indication of the visitor's presence, the security system 202 can emit a first sound with the speaker 488 (at step 562). The security system 202 can be configured to receive a second indication of a visitor's presence (at step 564). In response to receiving the second indication of the visitor's presence, the security system 202 can emit a second sound with the speaker 488 (at step 566). The first sound can be audibly different than the second sound.

Some of the indications can be interpreted as being associated with a friendly or welcome visitor, while other indications can be interpreted as being associated with an unfriendly or unwelcome visitor. According to these different indications, the security system 202, by the speaker 488, can emit different sounds.

With reference to Figure 7, when the security system 202 receives an indication that a visitor 580 has pressed the button 212 (at step 582), this can be interpreted as an indication of a friendly, or welcome visitor. In response to receiving the indication that the button 212 has been pressed, the speaker 488 can emit a first sound (at step 584), such as a friendly sound (e.g. "Welcome to our humble abode.").

As illustrated in Figure 8, when the security system 202 receives an indication that a visitor 586 has been moving in front of the security system 202 for a prolonged or predetermined time (e.g. 15 seconds or any time that indicates that the visitor is loitering) without pressing the button 212 (at step 588), this can be interpreted as an unfriendly or unwelcome visitor. In response to receiving the indication that the visitor has been moving in front of the security system 202 without pressing the button 212, the speaker 488 can emit a second sound (at step 590). The second sound can be an alert sound (e.g. a warning to move away from the building 300 – "Step away from the house!"). It should be appreciated that the security system 202 can be configured to emit any number of sounds, such as a third sound, a fourth sound, a fifth sound, and any number of additional sounds.

The security system 202 can be configured to receive any number of indications. For example, in addition to a button press and a motion of a visitor, the indications can include indications of a remote computing device 204, a noise, a thermal signature (such as a thermal gradient indicating the presence of a person or animal), a retina scan, a

fingerprint scan, a ground vibration, and the like. It should be appreciated that the indication can include any indication of a presence of any visitor, such as a person or animal.

In some embodiments, the security system 202 can emit different sounds for a first visitor. For example, as the first visitor approaches the building 300, the security system 202 can emit a first sound based upon the motion of the first visitor. As well, the security system 202 can emit a second sound once the first visitor pushes the button 212 of the security system 202.

Furthermore, any of the indications described in this disclosure can be associated with a visitor that is either welcome or unwelcome at the building. Accordingly, the security system 202 can be configured to any environment in which the building 300 is situated. For example, some buildings 300 can be located in high traffic areas where it is common for people to walk by the front of the security system 202 without pressing the button 212. In this regard, the security system 202 can be configured to ignore indications of motion and only emit sounds in response to affirmative indications that the visitor is visiting the building 300, such as an indication that the button 212 has been pressed. In some embodiments, the security system 202 can be configured to only respond to motion in certain zones. For example, if the security system 202 is located 20 feet from a busy sidewalk, then the security system 202 can be configured to ignore all motion that occurs more than 15 feet from the security system 202. In this manner, the security system 202 can only respond to movements occurring on the building property.

As well, combinations of indications can be interpreted in various manners. For example, a combination of an indication of motion (i.e. movement) of a visitor in front of the security system 202 and an indication that the visitor has pressed the button 212 can indicate that the visitor is welcome at the building 300. As previously described, the speaker 488 of the security system 202 can emit a friendly message in response to the combination of indications.

Even still, the security system 202 can be configured to emit different sounds in response to a positive detection of one indication and a negative detection of another indication. For example, if the security system 202 detects motion of a visitor but does not detect sound, this can be interpreted as an unwelcome visitor, such as a prowler

sneaking around the outside of the building 300. In response, the speaker 488 of the security system 202 can emit an alert sound (e.g. a warning to exit the premise before the authorities are notified).

Furthermore, the time of day and/or day when a visitor approaches the building 300 can also indicate whether the visitor is welcome or not. As shown in Figure 6, the security system 202 can be configured to receive an indication of a visitor's presence at a first time of day (at step 570). The first time of day can occur between sunrise and sunset, or any other time of day. In response to receiving the indication of the visitor's presence at the first time of day, the security system 202 can emit a first sound with the speaker 488 (at step 572). In some embodiments, the first sound comprises an audible message spoken by a female voice, while some embodiments may comprise an audible message spoken by a male voice.

Furthermore, the security system 202 can be configured to receive an indication of the visitor's presence at a second time of day (at step 574). It should be appreciated that the second time of day can occur between sunset and sunrise, or any other time of day. In response to receiving the indication of the visitor's presence at the second time of day, the security system 202 can emit a second sound with the speaker 488 (at step 576). In some embodiments, the second sound comprises an audible message spoken by a male voice, while some embodiments may comprise an audible message spoken by a female voice.

To illustrate a more specific example, such as the one shown in Figure 9, if a visitor 592 presses the button 212 at noon on a weekend day (at step 594), the speaker 488 can emit a welcome message (e.g. "Welcome. We'll be right there.) (at step 596). In another example, as illustrated in Figure 10, if a visitor 597 presses the button 212 at midnight on a workday (at step 598), the speaker 488 can emit a do not disturb message or a message instructing the visitor to come back another time (e.g. "Please come back tomorrow!").

Combinations of indications can be interpreted differently depending on the time of day. For example, in response to an indication of a motion and a noise during the day, the speaker 488 of the security system 202 can emit a friendly message. However, in

response to an indication of a motion and a noise during the night, the speaker 488 can emit a warning message.

Even still, the security system 202 can be configured to respond differently based on the unique circumstances of the indication. For example, if the motion detector 218 of the security system 202 detects a slow movement versus a faster movement, then the speaker 488 can emit different sounds based upon these various circumstances. A slow movement can be interpreted as a prowler approaching the building, while a faster movement, such as a movement of a person walking at 3.5 miles per hour, can be interpreted as a friendly visitor approaching the building 300.

The time of day can be any selected time of day and any number of time ranges can be used. For example, the security system 202 can emit a welcome message during sunrise to sunset and an alert or warning message during sunset to sunrise. Accordingly, because sunrise and sunset change on a daily basis, the security system 202 can be communicatively coupled to an outside database(s) to allow the security system 202 to thereby automatically respond to these ever-changing conditions.

The security system 202 (e.g. doorbell) can elect to emit a particular sound, such as a first sound or a second sound, based on a time at which the security system 202 detects an indication of a presence of a visitor. In some embodiments, the security system 202 is configured to detect an amount of light, which may indicate a time of day. In response to detecting the amount of light, the security system 202 can elect to emit the first sound or the second sound based on the amount of light.

As well, the security system 202 can be configured to provide unique responses during different time ranges on specific days. For example, the user may have a bowling league every third Monday of the month. Accordingly, during that time, (e.g. from 6pm-8:30pm) on the third Monday of the month, in response to detecting an indication of a presence of a friendly visitor, the speaker 488 of the security system 202 can emit a friendly message telling the visitor that their presence is appreciated but the visitor should come back another time. In another example, the user may be on vacation from the 1$^{st}$ to the 10$^{th}$ and the user may wish to emit more intimidating warnings to secure the building 300. Generally speaking, the security system 202 can be configured to emit any type of sound in response to any time of day and/or day.

The security system 202 can be configured to detect specific visitors and emit certain sounds in response to detecting the specific visitors. For example, if the security system 202 detects a first visitor, such as a relative of the homeowner, the security system 202 can always emit a friendly sound, no matter how the first visitor approaches the home, or during what time of day. As well, if the security system 202 detects a second visitor, such as an unknown party (e.g. a solicitor), the security system 202 can emit an unfriendly sound, no matter how the second visitor approaches the home, or during what time of day.

To determine the identity of a visitor, the security system 202 can use any type of identity recognition technology, such as facial recognition, to determine an indication of an identity of a visitor. Some of these types of identity recognition technologies are disclosed in U.S. Nonprovisional Patent Application No. 14/612,376; filed February 3, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS. The entire contents of Patent Application No. 14/612,376 are incorporated by reference herein.

The different types of sounds emitted by the speaker 488 can be configured to match the appropriate indication as detected by the security system 202. For example, if the security system 202 detects an unfriendly visitor, the speaker 488 can emit a message spoken by a male voice to thereby intimidate the unfriendly visitor. Contra, if the security system 202 detects a friendly visitor, the speaker 488 can emit a message spoken by a female voice to thereby welcome the visitor. As well, the security system 202 can be configured to emit any other type of sound. For example, a welcome visitor can be greeted by a pleasant melody or a ding-dong, while an unwelcome visitor can be greeted by an alarm sound or a warning message.

As well, messages can be spoken in any language, volume, pitch, accent, and the like. Users may find that various combinations of vocal characteristics to be useful in different situations. For example, if a user is hosting a Mardi gras party, the user can configure the security system 202 to emit a message spoken by a person with a southern accent. Generally, it should be appreciated that the speaker 488 of the security system 202 can be configured to emit any type of sound for any type of specific situation.

Likewise, the security system 202 can be configured to play a specific message if the potential visitor is not included in a list. For example, where a potential visitor is not included in a list of the resident's contacts, the security system 202 can be configured to indicate that the resident does not accept solicitors and/or request the visitor to provide identifying information or describe the purpose of the visit.

In some embodiments, the security system 202 can be configured to play a specific message if the potential visitor has a criminal background. For example, a user can configure the security system 202 to play a specific message where a potential visitor is a registered sex offender.

The sounds emitted by the security system 202 can be recorded by the user him/herself. As well, the sounds can be downloaded from another source, such as a remote computer (e.g. a remote server), a remote computing device (e.g. a smart phone), a website, a database (e.g. iTunes®), and the like. Also, methods can include selecting the first sound and the second sound with a remote computing device that is configured to receive alerts from the doorbell. The selected sounds can be wirelessly transmitted to the doorbell.

As well, the sounds can be recorded with a remote computing device 204 and the sounds can be set up for temporary use whereby the sounds can expire upon a predetermined time. For example, a user can enter an expiration date of the recorded sound with the remote computing device 204. Furthermore, the user can wirelessly send the first sound and the expiration date from the remote computing device to the doorbell. Once the expiration date passes, the security system 202 can then cease to emit the recorded sound from the security system 202.

As well, the security system 202 can be configured to receive sound emitting parameters from a remote computing device 204. The security system 202 can emit a predetermined sound based upon the sound emitting parameter. In some embodiments, the sound emitting parameter includes at least one of an identity of the first visitor, data associated with the first visitor, a time, a location of a user of the remote computing device. In some embodiments, the security system 202 can automatically download a third sound based on the sound emitting parameters. The security system 202 can emit the third sound from the speaker according to rules associated with the third sound.

ALERT COMMUNICATION EMBODIMENTS

Embodiments of the security system 202 can be configured to alert individuals located outside of a building (e.g. a home). For example, the security system 202 can be configured to flash a light, emit a sound (e.g. alternating high pitch and low pitch sounds), initiate a communication session with a remote computing device 204, and the like. These various alerts can be useful to individuals, such as first responders, seeking to identify the location of an event, such as an emergency event(s) occurring within or outside the home. Home, as used herein, may refer to a building whereby one or more occupants sleep in the building on a permanent basis. Home may distinguishable from an office building by the lack of permanent occupants that sleep in the office building. Home may refer to an apartment building due to the permanent nature of an occupant for the duration of a lease. Home may be distinguishable from a hotel due to the lack of permanent occupants.

Figure 11 illustrates an embodiment in which a security system 202 is communicatively coupled to a communication device 416. The security system 202 may be part of a communication system 400. The communication system 400 can be similar to that of the communication system 200 except, the communication system 400 may also be configured to allow communication between the security system 202 and the communication device 416.

In various embodiments, the security system 202 can be communicatively coupled, directly and/or via the cloud, to a communication device 416, such as a hub device, a communication system, and/or an event detection device 418, such as a sensor, (e.g., a peripheral device, such as a Nest Protect® (registered by Google Inc.), Nest Learning Thermostat® (registered by Google Inc.), DropCam® (registered by Google Inc.), and the like. The communication device 416, event detection device 418 and/or the security system 202 can be used to monitor various events within the building 300 (e.g., home). Specifically, the communication device 416 and/or event detection device 418 can detect emergency events and then notify the security system 202. In some embodiments, the communication device 416 is communicatively coupled to the event detection device 418 that detects the emergency event or adverse event (which is

discussed further herein). In this manner, the security system 202 may directly or indirectly receive a notification of the emergency event from the event detection device 418 and/or the communication device 416.

The security system 202 can communicate with the communication device 416 via a communication network 414. The communication network 414 can be similar to the wireless communication 230, however, the communication network 414 can be wired or wireless. In embodiments, the communication network 414 can utilize the existing electrical wires in the doorbell wires to communicate with the security system 202 (e.g., powerline networking). The communication network 414 can also utilize a wired Local Area Network. In embodiments, the communication network 414 can include a Wide Area Network (WAN) that connects the communication device 416 to the security system 202 over the Internet.

In embodiments, the communication device 416 is a type of device that is configured to connect multiple devices and facilitate communication between the multiple devices. The security system 202 may be a device that also is communicatively coupled to the communication device 416. The communication device 416 may receive a transmission from one device (i.e., an event detection device 418), make a determination on what type of communication to perform (e.g., an alert), and transmit the communication to a second device (e.g., the security system 202) to take further action.

The security system 202 can be configured to communicate with remote computing devices (i.e., the computing device 204). The computing device 204 may refer to a remote computing device in embodiments. The security system 202 can initiate a communication session through the communication network 414 by sending a request to the computing device 204 to establish a secure connection (e.g., a virtual private network) to enhance security. In embodiments, the communication session may also include an indication that an event (as discussed further herein) has been initiated.

The security system 202 can have an outer housing 224. The outer housing 224 may be configurable to attach to a building 300. The outer housing 224 of the security system 202 can attach to the building 300 using a variety of permanent or temporary mounting mechanisms. In embodiments, the permanent mounting mechanism may prevent the removal of the security system 202. The building 300 may include a variety

of structures. For example, the building 300 includes a home, which is a type of building 300. The home can include various types of structures in various square footages. For example, a home can be a wooden framed building with an exterior of stucco, brick, or siding. In embodiments, a home can be distinguished from other types of buildings based on the livable area (e.g., 500 square feet to 5000 square feet). In embodiments, a home can also be defined as being a freestanding structure without shared walls. A home may also be defined by zoning constraints. For example, the home may be zoned residential instead of commercial or industrial.

The outer housing 224 can also include a visitor detection system 412 coupled to the outer housing 224. The visitor detection system 412 can be an assembly of components that are collectively configured to detect visitors in the immediate vicinity (e.g., within 0.5 to 50 feet) of the security system 202. The visitor detection system 412 can include the doorbell button 212, the camera assembly 208, and an audio input device 410. In addition, the visitor detection system 412 can also include the motion detector 218 and fingerprint sensor 210. The audio input device 410 can be a device that captures audio (e.g., a microphone). The audio input device 410 can have various sensitivity ranges depending on the application. In embodiments, the audio input device 410 can include multiple microphones to extend the coverage area of audio capture. For example, the audio input device can have one microphone on board the outer housing 224 and receive input from another microphone located within the house (e.g., through the communication network 414).

The outer housing 224 may also include a deactivation unit 411. The deactivation unit 411 can be a component that is communicatively coupled to the security system 202. The deactivation unit 411 may be responsible for disabling the alert communication system 402. In embodiments, the deactivation unit 411 is part of the alert communication system 402. The alert communication system 402 may work passively or actively. In an active configuration, the security system 202 can actively monitor for a command to deactivate. For example, the security system 202 can send “activation status requested” signal to a deactivation unit 411 in regular intervals along with a unique randomized code and receive an “activation = True” signal from the deactivation unit 411 along with the unique randomized code. When communication is interrupted, then a non-response of the

activation status may indicate “activation = True”. When deactivated, the deactivation unit 411 transmits an “activation = False” signal along with the unique randomized code. The actively monitoring for the command can be advantageous where communication is lost with the deactivation unit 411 (i.e., the communication is modified or the deactivation is spoofed by an intruder).

The deactivation unit 411 may also passively monitor for the command. For example, an occupant may input a command through the deactivation unit 411 that is transmitted to the security system 202. The security system 202 can receive the command passively. In embodiments, the deactivation unit 411 may also be communicatively coupled with a remote computing device 204. The deactivation command may originate from the remote computing device 204 to deactivate the alert communication system 402 in either actively or passively.

The outer housing 224 can also include an alert communication system 402 coupled to the outer housing 224. The alert communication system 402 can be configurable to activate in response to an initiation of an event. For example, an alert from the communication device 416 that is transmitted to the security system 202 can activate various components on the security system 202 through the alert communication system 402. The alert communication system 402 can include components to communicate alerts to a user (e.g., an occupant of the home). In embodiments, the alert communication system 402 is the security system 202 or part of the security system 202. In embodiments, the alert communication system 402 includes a light 406 and a speaker 404. The light 406 can comprise the diagnostic light 216 and/or the power indicator light 220, as shown in Figure 1, and/or any other light coupled to the security system 202. As well, the speaker 404 may comprise the speaker 488, as illustrated in Figure 1, and/or any other speaker coupled to the security system 202.

In embodiments, the alert communication system 402 refers to a collection of components for the purpose of alerting an occupant of the building 300. The alert communication system 402 can also refer to a control unit for the components that alert an occupant of the building 300. The control of the alert communication system 402 can be separate from the control for the security system 202. In embodiments, the alert communication system 402 is attached to an exterior surface of the home (i.e., a building

300). The outer housing 224 may be attached to an interior surface of the home (i.e., a building 300). The remote computing device 204 can be operated by the homeowner (i.e., a type of occupant).

The speaker 404 of the alert communication system 404 can be configured to emit a sound in response to the initiation of the event. For example, if the communication device 416 transmits an alert that indicates an emergency, then the security device 202 can emit a sound in the speaker 404 that indicates danger. The speaker 404 can be configured to emit a wide-range of sounds and various decibel levels depending on the application. For example, a more severe alert can be louder than a less severe alert. The security system 202 can alert an occupant of suspicious smoke by saying the location of the smoke and the time the smoke was detected.

The speaker 404 can simply emit a voice that says “Danger, Danger, Danger” to alert an occupant of the building 300. The sound emitted by the security device 202 can be unique to the type of alert. For example, if a fire alert is transmitted by the communication device 416, then the security device 202 can emit a voice that says “Fire, Fire, Fire” and repeats at a set interval. Various sounds can also be used to selectively alert other occupants. For example, a high frequency sound of 24 kHz to 45 kHz can selectively alert canine occupants of the building 300 without alerting a human. In another example, a sound from 17 kHz to 23 kHz may selectively alert children but not adults. Various patterns of sounds can also be produced. For example, the “SOS” Morse code pattern may be used to indicate distress.

The light 406 of the security system 202 may be configurable to illuminate in response to the initiation of the event. The light 406 can emit a variety of colors in a variety of patterns. For example, the light 406 can emit both a green light, a white light, and a red light. A green light can be lit during normal operation. A white light color can be used for ordinary alerts, such as a power outage. A red light color can be used to indicate an imminent emergency that alerts the occupant to leave the building 300 immediately. For example, the red light color can be used to alert the occupant of a gas leakage or a fire or armed intruders.

In embodiments, the light 406 can flash at various frequencies to indicate a pattern. For example, three short flashes, followed by three long flashes, followed by

three short flashes, can indicate distress. While rapid flashes can indicate a higher priority than slower flashes of light. The light 406 can be coordinated with the speaker 404. For example, the light 406 can flash at the same time that the speaker 404 makes a sound. The light 406 can also flash before or after the emission of sound from the speaker 404.

The alert communication system 402 can also include emission of an odor. The odor can be discernable by an occupant to know that something is wrong or can ward away an intruder. For example, if the communication device 416 alerts the security system 202 of an intruder, then a strong smell (such as that of a skunk) can trigger a silent alarm. Various smells can be used. For example, flowery odors can be used for non-urgent alerts (such as a water leak) while mercaptan-based odors can be used for urgent alerts.

The alert communication system 402 can include remote communication 407. The remote communication 407 can be responsible for communicating with a remote computing device 204 the status of the alarm. In embodiments, the remote communication 407 can be a module that communicates with a security monitoring service, which can also have a dedicated communication channel that is different than the communication network 414 in order to alert authorities in the event of a power outage.

In embodiments, the security system 202 is powered by an electrical power input 408. The electrical power input 408 can be a battery. The electrical power input 408 can also be from an electrical source such as from a household Alternating Current. The electrical power input 408 can also be configured to receive a step-down voltage (e.g., around 8V to 24V) from doorbell wires 304. The alert communication system 402 may be electrically coupled to electrical wires 409 (through the electrical power input 408). The electrical wires 409 can be configurable to be coupled to the doorbell wires 304 of a home(e.g., the building 300). The alert communication system 402 can be configurable to activate in response to a determination that an event has been initiated through the electrical wires 409. In embodiments, the communication can happen over powerline networking. Various spikes in electrical signals from the electrical wires 409 can also signal the alert communication system 402. In embodiments, a lack of electrical signal from the electrical wires 409 can also activate the alert communication system 402. For example, the lack of electrical power input 408 from the electrical wires 409 can activate

the alert communication system 402. The alert communication system 402 can further utilize a backup battery system through the electrical power input 408 and cause the light 406 to emit white colored light so that an occupant can see.

The security system 202 may be configured as a passive or active device. As a passive device, the security system 202 may receive notifications of emergency events from the communication device and/or the event detection device 418. For example, a smoke detector event detection device 418 can transmit a smoke event to the communication device, which may communicate to the security system 202 an indication that the smoke event is occurring. The security system 202 can be monitoring for notifications from the communication device whenever a communication channel is established.

As an active device, the security system 202 may be configured to actively monitor whether the communication device and/or event detection device 418 has detected the occurrence or initiation of an emergency event (or adverse event). For example, the security system 202 can periodically request from the communication device a status of events. If there is no status, then the security system 202 can wait until another request is filled.

Figure 12 illustrates a block diagram of an enhanced view of various event detection devices 418, according to some embodiments. The event detection devices 418 can be communicatively coupled to the communication device. Types of event detection device 418 can include a smoke alarm 420 or a burglar alarm 422. The event detection device 418 can be configured to communicate with a communication device or to the remote device 204 through the communication network 414. In embodiments, the event detection device 418 can be “smart” and communicate with a variety of devices. The event detection device 418 can connect via the Internet of Things (IoT) and may each have a unique network identifier. The IoT may encompass various standards. For example, standards may include ALLJOYN® (Registered by Qualcomm Innovation Center Inc.), Thread Group, IEEE® (Registered by the Institute of Electronic and Electrical Engineers, Inc.) P2413 working group, IoTivity® (Registered by Samsung Electronics Co., Ltd.), or Representational State Transfer.

The security system 202 may comprise an alert communication system 402 that may include a light 406, a speaker 404, and a wireless communication system 230 that may be configured to initiate a transmission with a remote computing device 204. For example, the communication device may comprise a smart smoke detector 420 (e.g. Nest Protect®, registered by Google Inc.), and in response to the smart smoke detector detecting elevated levels of smoke 434, or elevated levels of other toxic gases, the security system 202 may activate its alert communication system 402 (e.g. flashing a light and/or emit a sound). This may thereby alert individuals outside the home as to the location of the home where the emergency event is occurring.

As well, it should be appreciated that the emergency event can comprise any type of event 424 that may require the attention of another party. As used, event can refer to an emergency event or an adverse event, which indicates harm to an occupant or requires the attention of a party other than the occupant. For example, the emergency event may comprise at least one of a fire 426, a gas leak 428, a break-in 436, elevated levels of smoke 434, elevated levels of radon 432, elevated levels of carbon monoxide 430, and the like.

The alert communication system 402 can be configured to alert individuals located outside the home in any variety of ways. For example, the alert communication system 402 can flash a bright light emitting diode and/or a light located behind the doorbell button 212, such as the diagnostic light 216, on the security system 202. In some examples, the alert communication system 402 can emit a loud sound from the speaker 404. For example, the loud sound can be alternating high and low pitch sounds that may be heard by individuals located within 300 feet of the home. The high and low pitch sounds can be of high and low frequencies that may be heard by individuals located within a neighboring home and/or a vehicle passing by. The loud sound can be a unique sound easily detectable by individuals. As well, the sound can comprise a noise that indicates danger or help is required.

Furthermore, the alert communication system 402 can be configured to initiate a transmission to a remote computing device 204. For example, if the security system 202 determines that a break-in has occurred, the security system 202 may initiate a computing session and/or a notification with the remote computing device 204 to alert an individual

that is operating the remote computing device 204 of the break-in 436 at the home. As well, it should be appreciated that the security system 202 can initiate a transmission to any other party, such as an emergency dispatcher (e.g. 911).

The security system 202 may be configured to activate its alert communication system 402 after a predetermined amount of time. The predetermined amount of time may be 0 seconds, 10 seconds, 20 seconds, 1 minute, and the like. Generally, it should be appreciated that the alert communication system 402 may activate nearly at the same time as the communication device 416 detecting the emergency event 424 or any time thereafter.

Figure 13 illustrates a flowchart of a method 500 of monitoring for an event through a communication device 416, according to some embodiments. The method 500 can generally involve connecting to a communication device 416 and receiving a notification of an event from the communication device 416. The security system 202 can react based on the event from the communication system. The method 500 begins at block 510.

In block 510, the security system 202 can establish a connection with the communication system. As mentioned herein, the communication device 416 may utilize either a wired or wireless connection 230 to communicate with the security system 202. For example, a wireless home network that utilizes Wi-Fi may be used or local Bluetooth™ pairing may be used. Once connection is established, then the communication device 416 may be configured to only communicate with security system 202 at the ID provided by the security system 202. For example, the security system 202 may have a unique IPv6 address that the communication device 416 transmits to. The communication device 416 may also have a unique IPv6 address that the security system 202 transmits to. The security system 202 may also be configured to receive alerts from only the IPv6 address that belongs to the communication device 416, thus preventing spoofing type alarms. Various permissions may be set up using an Application Programming Interface (API) of the communication device 416. For example, the security system 202 can be set up as a client with read/write permissions which identifies the security system 202 that has permission to share data with the communication device 416.

In block 512, the security system 202 may monitor for an event. In embodiments, the security system 202 monitors for an event from the communication device 416. For example, the communication device 416 may receive a notification of an event from an event detection device 418. In embodiments, the security system 202 can monitor for an event using localized components. For example, the security system 202 may have a camera that is used to monitor for suspicious activity. The event may be communicated with the communication device 416 and the communication device 416 may take appropriate action (e.g., notify emergency services). As mentioned herein, the types of events may be selected from at least one of a fire, a gas leak, a break-in, elevated levels of smoke, elevated levels of radon, elevated levels of carbon monoxide, and the like.

The event detection device 418 may detect an event using a variety of methods. For example, various thresholds may be employed to detect an event 424. For example, the elevated levels of smoke event 434 can be based off of optical obscuration or electrostatic precipitation. The smoke can be based off of a threshold of parts per million or percentage of optical transmittance. The radon event 432 can be based off of PicoCuries per Liter reading from a radon detection unit. The gas leak event 428 can be based off of an 80% Lower Explosive Limit. Various gas detectors can be used (e.g., electrochemical, infrared point, infrared imaging, semiconductor, ultrasonic, holographic, etc.). A fire event 426 may be detected using temperature or a combination of readings from a smoke event 434 and a carbon monoxide event 430. The break-in event 436 may utilize various sensors present in the security system 202 or external sensors to the security system 202 (e.g., motion sensors). The event 424 is associated with a home (i.e., building 300), and the doorbell (i.e., security system 202) is attached to the home of a homeowner.

In block 514, the security system 202 can determine whether an event has been initiated. The event may be initiated whenever the security system 202 receives a transmission from a communication device 416 communicatively coupled to the security system. The transmission may be over various forms of communication and provide an indication that the event has been initiated. The security system 202 may monitor the communication system to detect whether the event has been initiated. In embodiments, the security system 202 (e.g., the doorbell) can interface with a remote computing device

204 to further communicate to an occupant that there is an alert at the home. Communicating via the remote computing device 204 may have the benefit of keeping occupants informed while away from the home. The security device 202 can establish a communication session with a remote computing device 204 in a similar manner as to the communication device 416. The communication session may include an indication that the event that has been initiated. For example, an occupant can receive a communication of a fire alert on a local application on their remote computing device 204 from the security system 202.

In block 516, the security system 202 can determine the alarm type. In embodiments, block 516 may be optional. Despite a variety of devices available to the security system 202, not all devices or tools may be appropriate in certain settings. For example, a non-urgent alert (such as elevated radon levels) may not warrant a high-pitched, high-volume noise in the middle of the night. The security system 202 can balance the severity of the alert with the certainty for the alert. For example, significant amounts of dust can trigger a smoke detector but the certainty of a fire can be determined using a carbon monoxide detector in conjunction with the smoke detector. The severity of a fire may be high but if the certainty that a fire is occurring is low, then the security system 202 can determine that another alarm type is more appropriate. Examples of determining an alarm type are described further herein.

In block 518, the security system 202 can activate the alert communication system 402 in response to determining that the event has been initiated in block 514. In embodiments, activating the alert communication system 402 can include activating selected components of the alert communication system 402 (e.g., the speaker 404 or the light 406). As mentioned herein, the alert communication system 402 can include a light 406 which, when the alert communication system 402 is activated, can cause the light 406 to illuminate in a variety of patterns and colors. The alert communication system 402 can also include a speaker 404 that emits a sound in a variety of intensities, frequencies, and patterns. The activating can also include activating a control element for the alert communication system 402. The control element for the alert communication system 402 can instigate a variety of patterns and alerts for multiple components (e.g., a flashing light followed by emission of selected sound frequencies).

In block 520, once the alert communication system 402 is activated, the security system 202 can monitor for a command to deactivate the alert communication system 402. In embodiments, block 520 may be optional. For example, a user of the security system 202 may not desire the security system 202 to alert occupants (e.g., a false positive). The command can be a sequence of instructions that is understood by the security system 202 to deactivate the alert communication system 402. In embodiments, the command can be a button press and an audible predetermined message. For example, an occupant can push a button (e.g., the door bell button 220) and speak an audible predetermined message such as "Alarm Deactivate" to deactivate the alert communication system 402. In various embodiments, the deactivation unit 411 can be configured to perform vocal recognition in order to distinguish between the voice of the occupant with the voice of a non-occupant, such as a prowler. Once the command is received, then the method 500 can continue to operation 522.

In block 522, the security system 202 can deactivate the alert communication system 402 in response to receiving the command to deactivate the alert communication system. The alert communication system 402 may be deactivated in a variety of ways. For example, the alert communication system 402 may deactivate (e.g. turn off the current alert) in response to the security system 202 receiving an indication that the doorbell button 212 has been pressed. In some embodiments, the security system 202 may be configured to turn off the alert communication system 402 in response to receiving an audible predetermined message, such as a spoken safety message or a spoken password that indicates that the event is being attended to or has ended. In some embodiments, the security system 202 can receive a deactivation command from the remote computing device 204. In this manner, the individual operating the remote computing device 204 may send a command through the remote computing device 204 to terminate the ongoing alert. The deactivation of the alert communication system 402 can include selectively deactivating less than all of the components of the alert communication system 402. For example, the deactivating of the alert communication system 402 can include deactivating only the localized communication (i.e., the speaker 404 and the light 406) but not the remote communication 407 with law enforcement (e.g., a silent alarm).

Figure 14 illustrates an example table 600 of various alarm types that are used based on the certainty and severity of the event, according to some embodiments. The table 600 can correspond to block 516 in Figure 13 where a security system 202 can determine the alarm type. In embodiments, the alarm type may be pre-assigned depending on the certainty and the severity of the event. For example, an occupant may desire that a gas leak is always associated with an audible alarm and a red light, despite a low certainty.

The alarm type can also be based on threshold values. For example, if the certainty of a fire is 20% but the severity is high, the security system 202 can create a score that is based on the severity and the certainty. The security system 202, based on the score, can determine the type of alarm. For example, a high severity event with a low certainty may (such as the fire) may be associated with a sound to invite an occupant to investigate further. A high severity event such as a gas leak but with a higher certainty may trigger a red flash along with the sound. A low severity event such as a baby crying can trigger a different set of alarm types such as playing comforting music.

CUSTOMIZED SOUND EMBODIMENTS

The security system 202, or doorbell 202, may be configured to receive a custom sound(s) from a user and thereby emit the custom sound in response to a particular situation(s). For example, as illustrated in Figure 15, a doorbell system 200 may receive a custom message (at step 1500). A user of the system may then optionally assign the custom message to a select visitor (at step 1502). Thereby when an indication of a presence of the select visitor is detected by the doorbell 202 (at step 1504), the doorbell 202 may then respond by emitting the custom message with a speaker 404, 488 of the doorbell 202 (at step 1506). It should be appreciated that the term “detecting” may be defined as discovering or identifying the presence or existence of a visitor. As such, the term “detecting” may be used interchangeably with the term “determining.”

The custom sound, or custom message, may be received by the doorbell system 200 in a variety of ways. As shown in Figure 16, the doorbell system 200 may download the custom message from a remote computer, such as a remote computing device (e.g. a smart phone) (at step 1600). As well, the doorbell system 200 may record the custom

message (at step 1602). For example, a user of the doorbell system 200 may record the custom message on his or her remote computing device, such as a smart phone, (at step 1602) and then download the custom message from the smart phone onto the doorbell system 200. In some embodiments, the custom message may be directly recorded by the doorbell 202 (at step 1602), such as recorded by a microphone of the doorbell 202. Generally, it should be appreciated that the custom message may be recorded by any type of recording device that is communicatively coupled to the doorbell system 200 (at step 1602). In this manner, the doorbell system 200 may download the custom message from the recording device.

As further illustrated in Figure 16, any number of custom messages may be recorded and/or downloaded by the doorbell system 200. For example, the doorbell system may record and/or download a second custom message (at step 1604), a third custom message, a fourth custom message, and any number of additional custom messages.

The doorbell system 200 may also be configured to interact with a visitor whereby the doorbell system 200 gives and receives audible information. In this manner, the doorbell system 200 may interpret information from the visitor. With reference to Figure 17, the doorbell system 200 (e.g. a speaker 404, 488 of the the doorbell 202) may be configured to emit an audible question(s) (at step 1700). The doorbell system 200 (e.g. via a microphone of the doorbell 202) may then receive an audible response from the visitor (at step 1702). The doorbell system 200 may thereby determine the meaning of the audible response given by the visitor. For example, the doorbell system 200 may determine whether the audible response comprises a first meaning or a second meaning (at step 1704). For example, if the doorbell system 200 determines that the audible response comprises the first meaning, the doorbell 202 may then emit a first audible response, via the speaker 404, 488, (at step 1706). As well, if the doorbell system 200 determines that the audible response comprises the second meaning, the doorbell 202 may then emit a second audible response, via the speaker 404, 488, (at step 1708). In this manner, the doorbell system 200 may be a smart system that is able to interpret and respond to different responses given by the visitor.

The doorbell system 200 may also be configured to intiate a communication session with a remote computing device 204, such as a remote computing device 204 associated with the visitor and/or a user of the doorbell system 200 (e.g. a resident of the building 300). For example, the doorbell system 200 may detect an indication of a presence of a visitor (at step 1800). The doorbell system 200 may then initiate a communication session with the remote computing device of the visitor and/or the resident (at step 1802). The communication session may comprise any type of communication and/or transmission to the remote computing device, such as a text message, phone call, voicemail, email, and the like. For example, the communication session may comprise a written message that substantially matches a content of the custom message as emitted by the speaker 404, 488. In this manner, hearing impaired visitors may be able to receive the message.

Furthermore, in some embodiments, the doorbell system 200 may be configured to determine an identity of a first visitor and/or a second visitor. Accordingly, the doorbell system 200 may intiate a communication session, such as transmit a text message, to a remote computing device 204 that includes at least one of the identity of the first visitor and/or the identity of the second visitor. Generally, it should be appreciated that the communication session may include any type of information relating to the visitor and/or the visitor's presence at the doorbell 200.

The doorbell system 200 may also be configured to detect various types of visitors. In some embodiments, as illustrated in Figure 19, the doorbell system 200 may be referred to as a first doorbell system 200a, which may be configured to detect an indication of a presence of a criminal (at step 1900). The first doorbell system 200a may detect the indication of the presence of a visitor, such as a criminal, by receiving a notification from a second doorbell sysem 200b that is communicatively coupled to the first doorbell system 200a and remotely located with respect to the first doorbell system 200a. For example, the second doorbell system 200b may determine that a criminal is in the area and then alert all other doorbell systems 200 located within the vicinity, including the first doorbell system 200a.

With reference to Figure 19, in response to the doorbell 202 and/or doorbell system 200 detecting the indication of the presence of the criminal, the doorbell 202 may

emit a warning message with a speaker 404, 488 of the doorbell 202 (at step 1902). The doorbell system 200 may then initiate a communication session with a law enforcement agency to notify the agency of the presence of the criminal (at step 1904). It should be appreciated that the warning message may include a message to scare away the criminal and/or inform the criminal that the law enforcement agency has been contacted.

As shown in Figure 20, the doorbell system 200 may also be configured to identify a visitor, such as a criminal or suspicious person, by taking a picture of the visitor (at step 2000). The doorbell system 200 may then determine, based on the picture, that the visitor is included in a database of suspicious visitors, such as a database of criminals, that previously visited other doorbells 202 (at step 2002). The doorbell system 200, and/or a remote computer, may use facial recognition software to match the facial data of the criminal with facial data from a law enforcement database. As well, the doorbell system 200 may detect the indication of the presence of the criminal by detecting body language of the criminal, such as detecting evasive or suspicious moves, detecting a fingerprint of the criminal, detecting a retina of the criminal, and the like.

As well, the doorbell system 200 may be configured to determine various types of visitors. As shown in Figure 21, for example, the doorbell system 200 may determine that a visitor is a predetermined visitor type (at step 2100). The predetermined visitor type may comprise any type of visitor, such as a known visitor (e.g. a friend, a family member, and/or anyone included on a smart phone contact list of a user), a known visitor, a suspicious visitor, a criminal, and the like. In response to determining that the visitor is the predetermined visitor type, the doorbell system 200, via the doorbell 202, can select a custom message from a first message and a second message (at step 2102). In response to determining that the visitor is a known person, the doorbell system 200 may emit the first message (at step 2104). In some embodiments, the first message optionally includes a name of the known person. For example, the doorbell system 200 may determine that a known person named Tim, who is a friend of the resident, is present. Accordingly, the doorbell 202 may audibly announce, “Welcome, Tim.”

Likewise, in response to determining that the visitor is a stranger, the doorbell 202 may emit the second message (at step 2106). For example, if the doorbell system 200 determines that the stranger is a solicitor, the doorbell 202 may emit an audible message

informing the solicitor that the resident does not purchase items from solicitors, an apology, and an invitation to exit the premise. Generally, it should be appreciated that the doorbell system 200 may be configured to determine any type of visitor and emit any type of custom message in response to the type of visitor.

The doorbell system 200 may also be configured to emit custom messages in response to the occurrence of predetermined conditions. As illustrated in Figure 22, the doorbell system 200 may detect an indication of a presence of a visitor (at step 2200). The doorbell system 200 may thereby determine that a predetermined condition has occurred (at step 2202). For example, the predetermined condition may be a time of day, a period of days, such as a time when the resident(s) is on vacation, an event (e.g. a birthday party, during a football game, etc.), and the like. Accordingly, in response to the indication of the presence of the visitor and the occurrence of the predetermined condition, the doorbell 202 may thereby emit a custom message (at step 2204). It should be appreciated that the custom message may correspond with the occurrence of the predetermined condition. For example, if the predetermined condition is the occurrence of a game in which the resident's favorite football team is competing, then the custom message may be the fight song for the football team.

The predetermined condition may also be an occurrence when the resident(s) is away from the building 300 or when the resident(s) is located within the building 300. With specific reference to Figure 23, the doorbell system 200 may be configured to record and/or download more than one custom message, such as a first custom message and/or a second custom message, and then emit the respective custom message in particular situations (at step 2300). Accordingly, the method may thereby include determining whether a resident is located within the building 300 or whether the resident is not located within the building 300 (at step 2302). In response to determining that the resident is present within the building 300, the doorbell 202 may thereby emit the first custom message (at step 2304). For example, the first custom message may be a message informing the visitor that the resident will be right there, such as, "Please wait a moment. Mr. Banks will be right there" (whereby Mr. Banks is the resident). In response to determining that the resident is not present within the building, the doorbell 202 may thereby emit the second custom message (at step 2306). The second custom message may

include a message informing the visitor that the resident is busy (if the visitor is a suspicious person – to avoid a robbery) or away from the building 300 (if the visitor is a known person). For example, the second custom message may state, "I'm sorry. Mr. Banks is currently occupied. Please come back another time."

The doorbell system 200, via the doorbell 202, may be configured to receive the custom message in response to a variety of inputs as received by the doorbell system 200. For example, as shown by Figure 24, the doorbell 202 may receive an indication of a first button press from a button 212 of the doorbell 202 (at step 2400). In response to receiving the first button press, the doorbell 202 may thereby record the custom message and store the custom message within a memory of the doorbell system 200 (at step 2402). As well, the doorbell system 200 may be configured to receive an input, such as receive an indication of a second button press from the doorbell 202 (at step 2404). In response to receiving the second button press, the doorbell system 200 can thereby erase the custom message from the memory of the doorbell system 200 (at step 2406).

It should be appreciated that any reference to first button press, second button press, and the like, can refer to any number of button presses or duration of respective button presses. For example, the first button press can comprise two button presses and the second button press can comprise one button press. As well, the first button press can comprise one button press and the second button press can comprise two button presses. In some embodiments, the first button press can comprise the button 212 being pressed for a first duration and the second button press can comprise the button 212 being pressed for a second duration. It should be appreciated that the first duration can be greater than, equal to, or less than the second duration.

However, it should be appreciated that the inputs may be any type of inputs into the doorbell system 200. For example, in conjunction or instead of a first and second button press, the doorbell system 200 may be configured to receive various motions from the user. In some embodiments, the camera 208 of the doorbell 202 may detect a first motion from the user, such as the user waving a hand once. In response to detecting the first motion, the doorbell 202 may thereby record the custom message and store the custom message within a memory of the doorbell system 200. As well, the camera 208 may detect a second motion from the user, such as the user waving a hand twice. In

response to detecting the second motion, the doorbell 202 may thereby erase the custom message from the memory of the doorbell system 200. Generally, it should be appreciated that any type of input, such as a bodily motion, may be received by the doorbell system 200.

The doorbell system 200 may also be configured to provide security and anonymity to a user of the doorbell system 200. For example, as shown in Figure 25, the doorbell system 200 may record and/or download a first custom message (at step 2500). The first custom message may be spoken by a first voice. The doorbell system 200 may be configured to effectively convert the first message into a second message, whereby the second message is spoken by a second voice that is different from the first voice. The content of the first custom message can substantially match the content of the second custom message. As such, the doorbell system 200 may emit the second custom message (at step 2502) that is spoken by the second voice. In this manner, the doorbell system 200 may effectively protect the identity of the user (e.g. resident) of the doorbell system 200.

With respect to the various predetermined conditions, as shown in Figure 26, the doorbell system 200 may create a schedule of a first timeframe to emit a first sound, a second timeframe to emit a second sound, and a third timeframe to emit a third sound (at step 2600). The doorbell system 200 may thereby determine that a visitation time of the visitor is within the first timeframe (at step 2602), and in response to determining that the visitation time of the visitor is within the first timeframe, the doorbell 202 may emit the first sound (at step 2604). Accordingly, if the doorbell system 200 determines that the visitation time of the visitor is within the second timeframe, the doorbell 202 may emit the second sound. Likewise, if the doorbell system 200 determines that the visitation time of the visitor is within the third timeframe, the doorbell 202 may emit the third sound.

For example, the first timeframe might include overnight and morning hours when the resident is either sleeping or getting ready for work. The first sound may thereby inform a visitor that the resident is busy and that the visitor should come back another time. As well, the second timeframe might include daytime hours, when the resident is away at work. The second sound might include a message that the resident is not available and that the visitor can reach the resident at work or on the resident's smart phone, if the visitor is a known or trusted visitor. Finally, the third timeframe might

include a time during evening hours when the resident is home from work. The third sound may thereby inform the visitor that the resident will answer the door shortly. Generally, it should be appreciated that the doorbell system 200 may be configured to accommodate any timeframe or number of timeframes. As well, the doorbell system 200 may be configured to receive and thereby emit any sound in response to any of the respective timeframes.

With reference to Figure 27, the doorbell system 200 may be configured to receive any number of custom messages and then emit respective messages in response to the doorbell system 200 (e.g. the doorbell 202) detecting an indication of a presence of any number of respective visitors. The doorbell 202 may emit a first custom audible message with a speaker 404, 488 in response to the doorbell system 200 detecting an indication of a presence of a first visitor (at step 2700). As well, the doorbell 202 may emit a second custom audible message with the speaker 404, 488 in response to the doorbell system 200 detecting an indication of a presence of a second visitor (at step 2702). Likewise, the doorbell 202 may emit a third custom audible message with the speaker 404, 488 in response to the doorbell system 200 detecting an indication of a presence of a third visitor (at step 2704).

The first, second and third custom audible messages can be assigned to specific visitors or groups of visitors. For example, the first custom audible message may be assigned to a specific first visitor. As well, the first custom audible message may be assigned to a specific group or type of visitor, such as any known visitor.

As shown in Figure 28, the doorbell system 200 may be referred to as a first doorbell system 200a that is attached to a first building 300a. The first doorbell system 200a may be communicatively coupled to a second doorbell system 200b that is attached to an exterior of a second building 300b that is remotely located with respect to the first building 300a. Accordingly, the first doorbell 202a may also be communicatively coupled to the second doorbell 202b. Thereby, the first doorbell system 202a may detect an indication of a presence of a first visitor by receiving a first notification from the second doorbell system 202b (at step 2800). As well, the first doorbell system 202a may detect an indication of a presence of a second visitor by receiving a second notification from the second doorbell system 202b (at step 2802). In this manner, the first doorbell

system 202a and the second doorbell system 202b may be networked. This may allow doorbell systems 200 that are located within a specific area, such as a neighborhood, to communicate and transmit data to each other. The network of doorbell systems may exchange information and/or data to thereby monitor the entire neighborhood.

CHIME EMBODIMENTS

Chimes 302 (shown in Figures 3 and 31-37) can include all of the features, assemblies, parts, systems, and components of any doorbell 202 described herein or incorporated by reference. Chimes 302 can include all the items shown in Figure 12.

The chime 302 is a remote communication device that can be configured to communicate with any doorbell 202 described herein or incorporated by reference.

Referring now to Figures 31-37, a user can use the remote computing device 204 to select a sound emitted by the chime 302 (e.g., a remote communication device) located inside the building or silence the chime 302 located inside the building. Several embodiments include many different sounds that the chime 302 can emit when someone "rings" the doorbell 202 or is detected by the doorbell 202.

As illustrated in Figure 31, the chime 302 may receive backup or primary power from a power source of a building 300 and/or a battery 462b located within the chime. As well, the chime 302 may include various components to detect different events within the vicinity of the chime 302. For example, embodiments may include a motion detector 218 configurable to detect motion along an inside portion of the building 300. The chime 302 may also include a camera assembly 208b configurable to capture an image along the inside portion of the building 300. As well, the chime 302 may include a speaker 488b configurable to emit sounds and a microphone 484b configurable to receive an audible message spoken by a user.

Even still, in embodiments, the chime 302 (e.g., a remote communication device) may include additional components including, but not limited to, a thermometer 512b configurable to determine temperature along the inside portion of the building 300 and a humidity sensor 305 configurable to determine humidity along the inside portion of the building 300. The chime 302 may include a detection system 528b that may include miscellaneous detection components to monitor and detect various other events. As well,

the chime 302 may include a communication system 504b configurable to communicatively couple the chime to the doorbell 202, the remote computing device 204, and/or any other communication device. The communication system 504b may communicate via WiFi, Bluetooth, Bluetooth Low Energy, Thread, ZigBee, and the like. It should be appreciated that the chime 302 may utilize none, some, or all the same components as utilized by the doorbell 202.

A user can select a sound to be emitted by the chime 302 on her remote computing device 204 by using a control application 600. The remote computing device 204 can then send the sound to the chime 302 via the doorbell 202 (and/or via a server 206 and a wireless network 308). The sound can be a song, a greeting recorded by the user, or any other type of sound. Some embodiments include using a remote computing device 204 to download a sound from the Internet, sending the sound (or data associated with the sound) to the doorbell 202 (e.g., in response to using the remote computing device 204 to select the sound), sending the sound (or data associated with the sound) from the doorbell 202 to the chime 302, and/or emitting the sound from the chime 302.

As shown in Figures 32 and 33, the chime 302 can include an electrical plug 307. The plug 307 can be mechanically and electrically coupled to a power outlet 309 (as shown in Figure 33).

As illustrated in Figure 34, the doorbell 202 can serve as a communication bridge between the remote computing device 204 and the chime 302. The doorbell 202 can be used to enable the remote computing device 204 to control the chime 302. A user can select an option (e.g., a song or a chime setting) on the remote computing device 204, then the system can send information regarding the option to and/or from the computing device 204. Then, the system can send information regarding the option from the doorbell 202 to the chime 302 in response to the user selecting the option via the remote computing device 204. The communication 230 between the computing device 204 and the doorbell 202 can be wireless. The communication 230 between the doorbell 202 and the chime 302 can be wireless.

As illustrated in Figure 36, the chime 302 (e.g., a remote communication device) can serve as a communication bridge between the remote computing device 204 and the doorbell 202. This can be especially helpful when the doorbell 202 cannot access the

wireless network 308 of the building 300 to which the doorbell is mechanically and/or electrically coupled. The chime 302 can be located inside the building 300, and thus, is more likely to access the wireless network 308 of the building 300 (due to a superior signal strength of the wireless network 308 at the chime 302 compared to the signal strength at the doorbell 202, which can be located much farther from a router of the wireless network 308). Some embodiments include configuring the chime 302 to serve as a communication bridge between the remote computing device 204 and the doorbell 202 in response to a first wireless signal strength of the wireless network 308 at a first location of the chime 302 being greater than a second wireless signal strength of the wireless network 308 at a second location of the doorbell 202.

As illustrated in Figure 3, the chime 302 (e.g., a remote communication device) can serve as a communication bridge between the doorbell 202 and a wireless network 308 of a building 300.

Figure 32 illustrates embodiments of the chime 302 (e.g., a remote communication device) that include at least one plug 307 that may be electrically, mechanically and/or communicatively coupled to a power outlet 309. The one plug 307 can thereby electrically and/or communicatively couple the doorbell 202 to the wires of the power outlet 309.

The system 200 can be configured to communicate in various manners. In some embodiments, the remote computing device 204 communicates directly with the doorbell 202, while the doorbell 202 communicates directly with the chime 302. In some embodiments, the remote computing device 204 communicates directly with the chime 302, while the doorbell 202 communicates directly with the chime. Generally, it should be understood that the system 200 can be configured in any manner by the user.

METHODS OF USING A CHIME

According to various embodiments, the doorbell system 200 can emit sounds from a chime 302. As illustrated in Figure 38, the method can include selecting the sound by a remote computing device 204 (at step 1300). For example, the remote computing device 204 can allow a user to select the sound by toggling a radio button (not shown) as displayed on a screen of the remote computing device 204. In some examples, the user

can select the sound by selecting a song or any type of audio file from a database, such as a music database (e.g. iTunes®), that is accessible through the remote computing device 204. In some embodiments, the remote computing device 204 can be a server 206, a communication device with a user interface (e.g. smart phone, tablet, etc.), and the like.

With continued reference to Figure 38, methods can also include sending a data file, which can include a first data file 213 and/or a second data file 211, to a doorbell 202 that is communicatively coupled to the remote computing device 204 (at step 1302). The data file 211, 213 can include information that can represent the sound. The data file 211, 213 can be sent by the remote computing device 204 to the server 206 to the doorbell 202. However, in some embodiments the data file 211, 213 can be sent by the remote computing device 204 to the doorbell 202. As shown in Figure 30, the remote computing device 204 can instruct the server 206, via a wireless communication 230 including a signal 604, to send the data file 211, 213 to the doorbell 202.

As well, methods can include the doorbell 202 sending the data file 211, 213 to the chime 302 that is communicatively coupled to the doorbell 202 and remotely located with respect to the doorbell 202 (at step 1304). In embodiments, the data file 211, 213 is transmitted wirelessly to the chime 302. As well, in embodiments, the data file 211, 213 is transmitted via a wire, such as wire 304b, as shown in Figure 38. In this manner, the data file 211, 213 is transmitted via a sound file communication 209.

There are various ways that the chime 302 can receive the data file 211, 213. In some methods, the data file can be downloaded from a web server, by at least one of the doorbell and the chime. Even still, in some embodiments, the remote computing device 204 can download the data file from the web server.

Methods can also include emitting the sound from a speaker 488b of the chime 302 at least partially in response to the chime 302 receiving the data file 211, 213 and at least partially in response to the doorbell 202 detecting an indication of a presence of a visitor. In this manner, when a visitor visits the building 300, the doorbell system 200 can alert the user by playing any type of customized or prerecorded sound through the speaker 488b of the chime 302.

As well, users of the doorbell system 200 may configure the system 200 to emit the sound in accordance with certain parameters, such as sound emission parameters.

Accordingly, methods may include receiving, by the doorbell 202, a sound emission parameter from the remote computing device 204. Methods may also include emitting the sound from a speaker 488b of the chime 302 in response to the doorbell system 202 determining that the sound emission parameter has been met. In some embodiments, the sound emission parameters may comprise predetermined timeframes. For example, the user may elect a sound emission parameter, such as a "do not disturb" parameter, so that the chime 302 does not emit the sound during predetermined hours of the day. As well, in embodiments, the sound emission parameters 302 may comprise specific visitors. For example, if an unknown visitor or unwelcome visitor (e.g. a door-to-door salesperson) visits the building 300, the sound emission parameters can instruct the chime 302 not to emit the sound when the doorbell system 200 detects the presence of the unknown or unwelcome visitor.

The chime 302 may also be configured to emit an audible message from a speaker 488b of the chime 302. The audible message may be a message that is spoken by a user and recorded by the doorbell 202, the remote computing device 204, and/or the chime 302 itself. In embodiments, a user of the system 200 may wish to transmit an audible message through the chime 302. For example, a first resident may speak an audible message such as, "Honey, I'll be home in 30 minutes," into his/her remote computing device 204. Accordingly, the system 200 may emit the audible message from the chime 302. Furthermore, in embodiments, the first resident my type a message into his/her remote computing device 204, and the system 200 may thereby announce an audible message that comprises the contents of the typed message.

The chime 302 may also be used to detect motion and capture audio and video recordings along an inside portion of a building 300. Specifically, the method may include the motion detector 218b of the chime 302 detecting a first motion within the inside portion of the building 300. Methods may also include initiating a first communication session with the remote computing device 204 in response to the motion detector 218b of the chime 302 detecting the first motion. The first communication session may include a first notification of the first motion detected by the motion detector of the chime. For example, the chime 302 may detect a prowler within the inside portion

of the building 300 and the system 200 may thereby send an alert to the remote computing device 204 of the user.

In embodiments, the method may also include the motion detector 218b of the chime 302 detecting a second motion within an inside portion of the building 300. It should be appreciated that the second motion may be different from the first motion, or the same. The system 200 may thereby initiate a second communication session with a second remote computing device 204b in response to the motion detector 218b of the chime 302 detecting the second motion. The second communication session can comprise a second notification of the second motion detected by the chime 302. In this regard, the first remote computing device 204a may not receive the second communication session. Accordingly, the system 200 can be configured to alert different users based on different motions within the building 300. For example, the chime 302 may detect suspicious motions and thereby alert the police. In some examples, the chime 302 may detect non-suspicious motions within the building 300, such as the dog walking around, whereupon an alert is sent to the remote computing device 204 of the resident.

As well, methods may include selecting more than one sound and sending the more than one sound to the chime 302. For example, methods may include selecting a second sound by the remote computing device 204 and thereby sending a second data file comprising second information to the doorbell 202. The second information may represent the second sound. As well, methods may include sending the second data file to the chime 302.

In embodiments, the chime 302 may be configured to emit different sounds in response to different motions detected by the motion detector 218 of the doorbell along an outside portion of the building 300. For example, methods may include detecting a first motion, by a motion detector 218 of the doorbell 202, along the outside portion of the building 300. In response to the doorbell 202 detecting the first motion, the chime may thereby emit the first sound from a speaker 488b of the chime 302. As well, the motion detector 218 of the doorbell 202 may detect a second motion along the outside portion of the building 300. It should be appreciated that the second motion may be different from the first motion, or the same. Accordingly, methods may include emitting the second sound from the speaker 488 of the chime 302 in response to the doorbell 202

detecting the second motion. In this manner, the chime 302 may be configured to audibly alert people within the building 300 as to whether various motions have been detected by the doorbell 202. In embodiments, the chime 302 may emit an audible alarm if the doorbell 202 detects a suspicious motion. In embodiments, the chime 302 may emit a more friendly sound (e.g. "ding-dong") if the doorbell 202 detects a non-suspicious motion.

As illustrated in Figure 39, this disclosure also includes a method of using a doorbell system 200 to emit a sound from a chime 302. The method may include selecting a sound by a remote computing device 204 (at step 1400) and sending a data file 211, 213 comprising information to the chime 302 (at step 1402). It should be appreciated that the information may represent the sound. As well, the data file 211, 213 may be sent to the chime 302 by the remote computing device 204 and/or the server 206. Furthermore, methods may include detecting an indication of a presence of a visitor with a doorbell 202 (at step 1404) and emitting the sound from a speaker 488b of the chime 302 in response to detecting the indication of the presence of the visitor (at step 1406).

In addition to detecting motion, the chime 302 and/or the doorbell 202 may also capture audio, images and/or video. For example, as shown in Figures 35 and 36, in response to detecting a motion with the motion detector 218b of the chime 302, methods may include using the camera 208b of the chime 302 to capture an image and/or video within the inside portion of the building 300. It should be appreciated that the image and/or video may correspond to the motion detected by the chime 302. The image and/or video may thereby be sent to the doorbell 202 and/or the remote computing device 204 where the image and/or video can be viewed via a control application 600 viewed on a display 603 of the computing device 204.

As well, the method may use a microphone 484b of the chime to detect and record audio within the inside portion of the building 300. The audio recording may thereby be transmitted to the doorbell 202 and/or the remote computing device 204, where it can be played back.

As well, the system 200 may be configured to respond in other various ways in response to detecting a motion. For instance, in embodiments, in response to detecting a motion with the motion detector 218b of the chime 302, the doorbell 202 may flash a

light 216, 220 to thereby indicate to people passing by the building 300 that there is an event underway at the building 300. This may serve useful to personnel (e.g. law enforcement) to thereby determine the exact location of the building 300.

The chime 302 may be configured to emit any various type of sound in response to any of the previously mentioned components detecting various events. In embodiments, the chime 302 may emit a first sound in response to the doorbell detecting an indication of a presence of a visitor. As well, the chime 302 may emit a second sound in response to the motion detector 218b detecting motion along the inside portion of the building 300. Furthermore, if thermometer 512b detects that the temperature has exceeded a predetermined threshold, the chime 302 may emit a third sound, such as an announcement of the temperature as detected by the thermometer 528b. Even still, the chime 302 may be configured to emit a fourth sound in response to the humidity sensor 305 detecting that a predetermined humidity has been met.

As illustrated in Figure 40, the disclosure also includes methods of identifying visitors and emitting different sounds according to the visitor detected. For example, methods may include recognizing, by a doorbell 202, a first visitor (at step 1500). The method may include emitting the first sound from the chime 302 in response to recognizing the first visitor (at step 1502). As well, the method may include emitting a second sound from the chime in response to not recognizing, by the doorbell 202, a second visitor (at step 1506). It should be appreciated that the first sound and the second sounds can be different, or the same.

In order to detect the visitor, methods may include recognizing the first visitor and/or the second visitor by detecting various traits, such as a physical trait of the respective visitor. Physical traits can include traits such as a fingerprint, gait, body type, height, silhouette traits, silhouette volume, silhouette dimensions, other physical characteristics, and the like. As well, the system 200 may be configured to recognize the first visitor and/or the second visitor by the doorbell 202 detecting a trait of an electronic device in the possession of the first visitor and/or the second visitor. For example, the system 200 may be configured to detect a first remote computing device 204d associated with the first visitor and/or a second remote computing device 204e associated with the

second visitor. In response to detecting a visitor by physical traits and/or electronic traits, the chime 302 may emit a sound associated with the particular visitor.

The following patent applications, which are incorporated by reference herein, describe additional embodiments of recognizing visitors: U.S. Provisional Patent Application No. 62/135,133; filed March 18, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; U.S. Provisional Patent Application No. 62/016,050; filed June 23, 2014; and entitled IDENTITY VERIFICATION USING A SOCIAL NETWORK; U.S. Provisional Patent Application No. 62/016,053; filed June 23, 2014; and entitled IDENTITY VERIFICATION USING A SOCIAL NETWORK AND A NAME OF A VISITOR; and U.S. Provisional Patent Application No. 62/016,057; filed June 23, 2014; and entitled IDENTITY VERIFICATION OF FREQUENT AND NON-FREQUENT VISITORS.

WIRED COMMUNICATION EMBODIMENTS

In addition to the doorbell system 200 being configured to be electrically and communicatively coupled via any wireless communication standard, the doorbell system 200 may also be electrically and communicatively coupled via any type of wired communication standard (e.g. wires). In embodiments, the wires may be the copper wires of the building 300.

As shown in Figure 36, the doorbell system 200 may be coupled to a doorbell power supply 312 of a building 300. Accordingly, the doorbell system 200 may include a first wire 304c that may electrically couple the doorbell 202 to the power supply 312 of the building 300. As well, the doorbell system 200 may include a second wire 304b that may electrically and/or communicatively couple the chime 302 to the doorbell 202. As well, the doorbell system 200 may include a third wire 304a that may electrically couple the chime 302 to the power supply 312 to form a circuit comprising the first wire 304c, the doorbell 202, the second wire 304b, the chime 302, the third wire 304a, and the power supply 312.

Because the doorbell 202 may be communicatively coupled to the chime 302 via the second wire 304b, the chime 302 may be configured to receive a first data file from the doorbell 202 via the second wire 304b. As well, the doorbell system 200 may include

a sound file communication 209 that may be sent from the doorbell 202 to the chime 302 via the second wire 304b. In some embodiments, the sound file communication 209 may comprise at least one thousand bytes. As well, in embodiments, the sound file communication 209 may comprise less than one thousand bytes. It should also be appreciated that the second wire 304b may enable two-way communication from the doorbell 202 to the chime 302 and/or from the chime 302 to the doorbell 202.

In embodiments, the first data file may comprise commands to perform various operations or put the doorbell system 200 into various settings. For example, the first data file may comprise a command configured to place the chime 302 into silent mode, such that the chime 302 does not emit a sound. Likewise, the first data file may comprise a command configured to adjust a volume setting of the chime 302. Even still, the first data file may comprise a command configured to adjust a duration of a notification sound emitted by the chime 302. Generally, it should be appreciated that the first data file may command the chime 302 to perform any such operation.

Even still, the data file may comprise data gathered by the doorbell system 200, such as a video recorded by the doorbell 202. Accordingly, the data file may include information regarding an event that occurred outside the chime 302, such as the presence of a prowler or an image of an object associated with a motion detected by the system 200. In this regard, the data file may comprise identifying information regarding the person and/or object detected by the chime 302. For example, the doorbell 202 and/or chime 302 may detect a person located outside or inside the building 300. The chime may then receive the data file that comprises the identity of the person as detected by the doorbell 202 and/or chime 302. As well, the doorbell 202 may wirelessly receive the first data file from the remote computing device 204. In this manner, the
doorbell 202 may receive various files, such as audio, and an image and/or video as recorded by the chime via the first wire. It should also be appreciated that the chime 302 may receive the various files from the doorbell 202 and/or the remote computing device 204.

As illustrated in Figure 41, the disclosure also includes a method of electrically coupling a doorbell system 200 to a doorbell power supply 312 of a building 300. The method may include coupling a doorbell 202 to a remote chime 302 via a first wire 304c

(at step 1600). As well, the method may include receiving, by the doorbell 202, a first data file comprising information (at step 1602). As further shown in Figure 41, the method may include sending a second data file comprising the information from the doorbell to the remote chime via the first wire (at step 1604).

The information may represent a sound that was unknown to the chime 302 prior to receiving the second data file. In this regard, the method may include emitting the sound from the chime 302 at least partially in response to receiving the second data file. In this regard, the method may include the chime using the second data file to emit a sound. In some embodiments, the second data file may comprise at least one thousand bytes. As well, in embodiments, the second data file may comprise less than one thousand bytes.

As well, the method may include emitting the sound from the chime 302 at least partially in response to the chime 302 receiving a sound emission parameter from the doorbell 202 and/or the remote computing device 204. For example, the chime 302 may receive a sound emission parameter to only emit the sound between the hours of 9am and 9pm. Accordingly, if the system 200 detects a presence of a visitor between 9am and 9pm, and in response to the chime 302 having received the data file, the chime 302 may emit a sound in response to the doorbell system 200 having determined that the sound emission parameter has been met.

CHIME-HUB COMMUNICATION EMBODIMENTS

In embodiments, the chime 302 can serve as the communication hub that links the doorbell 202 to the remote computing device 204, and vice versa. The chime 302 can be configured as the communication hub for a variety of reasons. For example, in certain situations, the doorbell system can be configured to detect whether the doorbell 202 comprises inadequate wireless performance to communicate with a remote computing device 204 via at least one of the wireless network and a cellular network. Accordingly, when the doorbell 202 receives inadequate wireless performance, the doorbell 202 can thereby communicate with the chime 302, which in turn communicates with the remote computing device 204 to thereby communicatively couple the doorbell 202 to the remote computing device 204.

Accordingly, and as illustrated in Figure 42, methods of using the doorbell system can include coupling communicatively the chime 302 to a wireless network of the building 300 (at step 1700). The chime 302 can thereby be communicatively coupled to the doorbell 202 and to a remote computing device 204 (at step 1700).

In embodiments, the doorbell system can be used to detect an indication of a presence of a visitor and thereby transmit the indication from the doorbell 202 to the remote computing device 204 via the chime 302. The presence of the visitor can be detected via a variety of indications. For example, methods can include detecting, by the doorbell 202, a trigger of a button 212 of the doorbell 202 (at step 1702).

As further illustrated in Figure 42, methods can also include sending an alert 232a, such as a visitor alert 232a, from the doorbell 202 to the chime 302 and thereby sending the visitor alert 232a from the chime 302 to the remote computing device 204 (at step 1706). In this manner, the chime 302 can communicatively couple the doorbell 202 to the remote computing device 204. As such, the chime 302 can serve as the hub that communicatively couples the doorbell 202 to the remote computing device 204. In some embodiments, the visitor alert 232a, 232b can be transmitted via the data file 213, first data file 213b, second data file 213a, and/or the data file 211.

Accordingly, the visitor alert 232a can be sent from the doorbell 202 to the chime 302 and/or the remote computing device 204 by a variety of methods. For example, in some embodiments, the doorbell 202 can be communicatively coupled to the chime 302 via a wire, a wireless network of the building 300, and/or a cellular network. As well, the chime 302 can be communicatively coupled to the remote computing device 204 via the wireless network of the building 300 and/or a cellular network. Methods can thereby include sending the visitor alert 232a from the doorbell 202 to the chime 302 via any combination of transmission systems including the wire, wireless network of the building 300, and/or cellular network (at step 1708). As well, methods can include sending the visitor alert 232a from the chime 302 to the remote computing device 204 via any combination including the wireless network of the building 300 and/or cellular network (at step 1708).

In some situations, the doorbell 202 may receive a wireless signal, but the wireless signal may be inadequate to transmit specific communications from the doorbell

202 to the remote computing device 204. In these situations, the chime 302 may serve as the communication hub between the doorbell 202 and the remote computing device 204. Accordingly, methods may include sending the visitor alert 232a from the chime 302 to the remote computing device 204 in response to the doorbell system detecting that the doorbell 202 comprises inadequate wireless performance to send the visitor alert 232a to the remote computing device 204 via at least one of the wireless network and a cellular network (at step 1710). Described differently, some methods can include sending the visitor alert 232a from the chime 302 to the remote computing device 204 in response to the doorbell system detecting that a wireless signal of the doorbell 202 is below a threshold (at step 1712).

The doorbell 202, remote computing device 204, and the chime 302 may be located in different locations with respect to each other. For example, the doorbell 202 may be located outside of the building 300, the chime 302 may be located inside the building 300, and the remote computing device 204 can be remotely located with respect to the building 300. As illustrated in Figure 43, methods may include sending the visitor alert 232a from the doorbell 202 to the chime 302 while the doorbell 202 is located outside the building 300 and while the chime 302 is located inside the building 300 (at step 1800). As well, methods may include sending the visitor alert 232a from the chime 302 to the remote computing device 204 that may be located inside or outside of the building 300.

The visitor alert 232a can take various forms that alert a user that a visitor is present at the doorbell 202 or that a visitor has left a message for the user via the doorbell 202. In this regard, the visitor alert 232a can comprise a video, an image, a sound, a text message, an email, a phone call, and the like. With reference to Figure 42, methods can include capturing the video and/or image via a camera assembly 208 of the doorbell 202 (at step 1704). As well, in embodiments where the visitor alert 232a comprises a sound, methods can include recording the sound with a microphone 484 of the doorbell 202. Methods can even include the visitor making a phone call through the doorbell 202 to the remote computing device 204, whereby the chime 302 communicatively couples the doorbell 202 to the remote computing device 204 to enable the phone call.

Upon the doorbell 202 capturing video, images, sounds, and the like, the doorbell system can thereby include various communications between the doorbell 202 and the chime 302, and between the chime 302 and the remote computing device 204. For example, the doorbell system can include a first communication from the doorbell 202 to the chime 302. The first communication can include a video and/or image taken by a camera 208 of the doorbell 202. Accordingly, the doorbell system can include a second communication from the chime 302 to the remote computing device 204. The second communication can also comprise the video.

Even still, the chime 302 can be communicatively coupled via the wireless network and/or cellular network to other peripheral devices, such as a door lock (e.g. a smart door lock) (at step 1802), a remote sensor (e.g. a fire alarm, a smoke alarm, a carbon monoxide detector, and a burglar alarm) (at step 1804), and the like. In this regard, the chime 302 can serve as the communication hub, not only between the doorbell 202 and the remote computing device 204, but also between the doorbell 202, the remote computing device 204, the door lock, the remote sensor, and any other peripheral device.

By configuring the chime 302 as the communication hub between such devices, the chime 302 may be used to transmit and communicate messages and instructions between devices. For example, a user may enter an instruction on a remote computing device 204 to lock a front door lock. The instruction may then be sent from the remote computing device 204 to the chime 302 whereby the chime 302 sends the instruction to the front door lock to move to a locked position. In response, the front door lock may lock the front door.

In another example, the chime 302 may detect an indication of an adverse event and/or receive the indication of the adverse event from the remote sensor. The adverse event can comprise various events, such as a motion, breaking glass, fire, a fire alarm sound, smoke, and the like. Accordingly, methods can include directly detecting an adverse event with the chime 302 (at step 1806), such as detecting the sound of glass breaking via a microphone of the chime 302. As well, methods can include the chime 302 receiving an indication of the adverse event from the remote sensor that is communicatively coupled to the chime 302, whereby the remote sensor is configured to detect adverse events. As illustrated in Figure 43, methods can include sending an alert

232b of the adverse event (e.g. an adverse event alert 232b) to the remote computing device 204 in response to detecting the adverse event (at step 1808). As should be appreciated, the adverse event alert 232b can comprise a notification of the adverse event to thereby put the user on notice of the adverse event.

The chime 302 can be configured to communicate with other devices, such as the remote computing device 204, remote sensors, and the like, via any wireless personal area network. For example, the chime 302 can be configured to communicate via Bluetooth, Bluetooth low energy, and the like. In this manner the chime 302 can communicate with Bluetooth low energy tags.

In various embodiments, the chime 302 may include a light configurable to illuminate an area or provide ambient lighting for comfort, such as a nightlight. The light may comprise the diagnostic light 216, the power indicator light 220, and/or any other light electrically coupled to the chime 302. As well, the light may be activated by various means, such as in response to an audible message from a user (e.g. "Max, turn on the light"). Even still, the light may be configurable to activate in response to external conditions, such as darkness of an adjacent area, much like a nightlight.

Referring now to Figure 36, a system can include a remote sensor 418 that is located outside of the doorbell 202, outside of the chime 302, and outside of the remote computing device 204. The remote sensor 418 can be located inside or outside of the building 300. The remote sensor 418 can include a speaker 488c that can emit sounds 236 (e.g., alarm sounds). A microphone 484b (shown in Figure 31) of the chime 302 can detect (e.g., "hear") the sounds 236. Then, the chime 302 can send a notification to the remote computing device 204 in response to detecting the sounds 236 and/or in response to receiving a wireless communication 230 from the remote sensor 418.

Remote sensors 418 can include a fire alarm, a smoke alarm, a carbon monoxide detector, a motion sensor, a glass-break sensor, and a burglar alarm. For example, the chime 302 can listen for a smoke alarm. Then, the chime 302 can send a notification to the remote computing device 204 in response to hearing the alarm sound of the smoke alarm.

Some embodiments include sending a second alert from the chime 302 to the remote computing device 204 in response to receiving, by the chime 302, a communication from the remote sensor 418. Several embodiments include coupling

communicatively the chime 302 to a remote sensor 418. The remote sensor 418 can comprise at least one of a fire detector, a smoke detector, and a carbon monoxide detector. Embodiments can also include sending a second alert from the chime 302 to the remote computing device 204 in response to receiving, by the chime 302, a communication from the remote sensor 418.

Several embodiments comprise detecting, by a microphone 484b (shown in Figure 31) of the chime 302, an alarm sound emitted by a remote sensor 418, and then sending a second alert from the chime 302 to the remote computing device 204 in response to detecting the alarm sound. Some embodiments include detecting, by a microphone 484b of the chime 302, an alarm sound emitted by a remote smoke detector (e.g., 418), and then sending a second alert from the chime 302 to the remote computing device 204 in response to detecting the alarm sound. Several embodiments include detecting, by a microphone 484b of the chime 302, an alarm sound emitted by a remote motion sensor device (e.g., 418), and then sending a second alert from the chime 302 to the remote computing device 204 in response to detecting the alarm sound.

Burglars often break glass windows and glass doors to enter homes and other buildings. Some embodiments include detecting, by a microphone 484b of the chime 302, glass breaking, and then sending a second alert from the chime 302 to the remote computing device 204 in response to detecting the glass breaking.

Some systems include a remote sensor 418 having at least one of a fire detector, a smoke detector, a carbon monoxide detector, a motion detector, and a glass-break detector. The remote sensor 418 can be communicatively coupled to the chime 302 (e.g., via wireless communication 230). Systems can include a third communication from the remote sensor 418 to the chime 302.

Several systems include a chime 302 that has a microphone 484b (shown in Figure 31). Systems can also include a remote sensor 418, an alarm sound 236 emitted by the remote sensor 418, and a third communication sent from the chime 302 to the remote computing device 204 in response to the microphone 484b of the chime 302 detecting the alarm sound 236.

Figure 36 illustrates a doorbell system configured to be coupled to a building 300 having a wireless network 308. The doorbell system can include a doorbell 202 having a

button 212 configured to be pressed by a visitor to notify occupants of the building 300. The doorbell 202 can comprises a first wireless communication system 503 and a second wireless communication system 507 (as shown in Figure 44). The first wireless communication system 503 can consume less energy per unit of operating time than the second wireless communication system 507.

The doorbell system also includes a remote communication device (e.g., the chime 302) coupled to a power outlet 309 (as shown in Figure 33) of the building 300 and located remotely relative to the doorbell 202. The remote communication device 302 comprises a speaker 488b configured to emit a sound in response to the visitor pressing the button 212. The remote communication device 302 comprises a third wireless communication system 509 and a fourth wireless communication system 511 (as shown in Figure 44). The third wireless communication system 509 can consume less energy per unit of operating time than the fourth wireless communication system 511.

In some embodiments, the second 507 and fourth 511 wireless communication systems can be Wi-Fi systems. The first 503 and third 509 wireless communication systems can be Bluetooth, Bluetooth Low Energy, Thread, ZigBee, and or any other suitable system. An advantage of some embodiments is that more power-hungry communication systems are used less often than more energy efficient systems. This can be especially helpful when the doorbell 202 runs on battery power.

As shown in Figure 44, the remote communication system 302 is communicatively coupled with the wireless network 308 via the fourth wireless communication system 511, and is communicatively coupled with the first wireless communication system 503 of the doorbell 202 via the third wireless communication system 509. The doorbell 202 is communicatively coupled with the wireless network 308 via the second wireless communication system 507 in response to receiving a communication from the remote communication device 302 via the first wireless communication system 503.

Figure 45 illustrates how a remote computing device 204 can send a communication to a wireless network 308 of a building, which can then send a wireless communication to the fourth wireless communication system 511. The remote communication device 302 can then use its third wireless communication system 509 to

send a communication to the first wireless communication system 503 of the doorbell. The doorbell 202 can then use its second wireless communication system 507 to send a communication to the wireless network 308 and/or to the remote computing device 204.

The communication can be a doorbell setting parameter that a user "sets" by selecting an option on an "app" run by the remote computing device 204. The doorbell 202 can update a doorbell setting (e.g., power management settings, camera settings, notification preferences, doorbell light settings) in response to receiving the doorbell setting parameter.

In some embodiments, the doorbell 202 "wakes up" in response to receiving a communication from the remote communication device 302. The remote communication device 302 can send the doorbell 202 a wake up command in response to receiving a wake up command from the remote computing device 204. The doorbell 202 can "wake up" by turning on the camera, starting to record a video, and/or beginning wireless communication with the wireless network 308.

Figure 46 illustrates a front view of another doorbell 202m. This doorbell 202m includes a battery 462. The battery 462 can provide electrical power such that the doorbell 202m does not need to be connected to a building's electrical system to receive electricity. This doorbell 202m can include any of the items described in the context of other doorbells 202 illustrated herein or incorporated by reference.

MULTI-DWELLING UNIT SYSTEM AND METHOD EMBODIMENTS

The doorbell systems 200 described herein may be used to gain and/or restrict access to residents and visitors in buildings, such as multi-dwelling unit buildings. As used herein, the term "building" can refer to any dwelling such as a home, an apartment building, a hotel, and any other structure that permanently or temporarily provides shelter to people.

In some embodiments, the building 300 may be equipped with a plurality of doorbells 202 and locks 250 mounted adjacent to various access points of the building, such as the main door and individual units within the building. In some embodiments, a guest wishing to visit a resident of the building may push a button on a doorbell 202 located at or near the front entrance to the building. The doorbell system 200 may thereby

determine whether the guest is authorized to gain access to the building. The system 200 may determine the guest's authorization in a variety of ways. In some embodiments, the system 200 automatically determines whether the guest is authorized through various identification data, such as facial recognition data, voice recognition data, and the like. Even still, in some embodiments, the system 200 may receive a manual input from a resident, such as the resident determining that the guest is authorized to enter the building and the resident selecting an input on a remote computing device that thereby instructs the system 200 to grant access to the guest.

Even still, systems 200 may further be configured to grant and/or restrict access to visitors in a variety of ways. For example, the system 200 may provide a temporary key to a guest's remote computing device 204 that the guest could wave in front of an access point, which could be situated in various locations throughout the building, to allow the guest access to different portions of the building.

To describe and illustrate further configurations we now refer to the figures. As shown in Figure 47 the disclosure includes a doorbell system 200 configured to be coupled to a building 300. In some embodiments, the system 200 includes a remote computing device 204 and a doorbell 202 coupled to the building 300 and communicatively coupled to the remote computing device 204. The doorbell 202 can include a camera 208 configurable to capture images, a microphone 484 configurable to receive audio, and a button 212 configurable to be pressed by a visitor to notify an occupant of the building 300. The system 200 can also include a lock 250 coupled to the building 300 and communicatively coupled to at least one of the doorbell 202 and the remote computing device 204. The lock 250 can be configurable to be locked and unlocked in response to an input received by the remote computing device 204.

As shown in Figure 48, the building 300 can be a multi-unit building and the lock 250 can be a main lock 250a coupled adjacent to a main entrance 700 of the building 300. The system 200 can also include a first lock 250b coupled to a first door 702 of a first apartment unit within the building 300 and communicatively coupled to at least one of the doorbell 202 and a remote computing device 204a. The first lock 250b can be configurable to be locked and unlocked in response to a second input received by the first remote computing device 204a. In this regard, the system 200 can be arranged and

configured to allow residents to grant/deny access to visitors not only at the main entrance, but also individual apartments/units within the building 300. For example, a resident may wish to grant a delivery person access to the main lobby so that the delivery person can leave the resident's package in the lobby. However, the resident may wish to deny the delivery person access to the resident's apartment. In another example, the resident may wish to grant an authorized visitor, such as a family member, access not only to the main lobby, but also to the resident's individual apartment.

With continued reference to Figure 48, the system 200 can include a second remote computing device 204b communicatively coupled to the doorbell 202. The system 200 can also include a second lock 250c coupled to a second door 704 of a second apartment unit within the building 300 and communicatively coupled to at least one of the doorbell 202 and the second remote computing device 204b. The second lock 250c can be configurable to be locked and unlocked in response to a third input received by the second remote computing device 204b.

In some embodiments, the system 200 includes a remote server 206 communicatively coupled to at least one of the remote computing device 204, the doorbell 202, the first lock 250b, and the second lock 250c. The server 206 can be configurable to store a plurality of Internet protocol (IP) addresses. The server 206 can thereby use the plurality of IP addresses to determine a location of the doorbell 202 based upon an IP address of the doorbell 202. In some embodiments, the remote server 206 recognizes the IP address and then identifies the building and the building's location based on the IP address. Once the system 200 identifies the building, the system 200 can then narrow down the list of possible voice/facial recognition data to a smaller list of voice/facial recognition data for just that building. Accordingly, this may result in improved speed and efficiency for the system 200 to identify the visitor from the voice/facial recognition data.

The doorbell system 200 may be sized and shaped to define different form factors (designs, shapes, sizes, and the like). For example, as shown in Figures 49 and 50, the main lock 250a may define a first form factor 706a while the first lock defines a second form factor 708a. As shown in Figure 49, the first form factor 706a and the second form factor 708a may be substantially the same, or substantially identical. In other

embodiments, and as shown in Figure 50, the first form factor 706b and the second form factor 708b may be different.

Furthermore, the doorbell system 200 may be arranged and configured to capture data, such as facial recognition data and/or voice recognition data, and determine an identity of the visitor based on the data. The remote server 206 may also be configured to store data that can be used to determine the identity of visitors. In some embodiments, the server 206 may also store facial recognition data and voice recognition data and thereby determine an identity of the visitor based upon the data.

As shown in Figure 51, the disclosure includes a method of using a doorbell system 200 to enable an occupant to grant a visitor access to a building 300. Embodiments may include determining, via the doorbell system 200, an indication of a presence of the visitor (at step 5100). Methods may also include determining, via a remote server 206 communicatively coupled to the doorbell system 200, a location of the doorbell system 200 based upon an Internet protocol address of the doorbell system 200 (at step 5102). Methods may thereby include unlocking a lock 250 of the doorbell system 200 (at step 5104).

Methods may also include receiving, via a microphone 484 of the doorbell system 200, an audible message from the visitor (at step 5106). Accordingly, methods may include determining whether the visitor is an authorized visitor (at step 5108). Methods may even include automatically unlocking the lock 250 in response to determining that the visitor is the authorized visitor (at step 5110). Accordingly, embodiments may also include automatically locking the lock in response to determining that the visitor is not the authorized visitor (at step 5112).

The system 200 may perform various actions in response to determining whether the guest is authorized or unauthorized to access the building 300. For example, methods may include initiating a communication session between the doorbell 202 and a remote computing device 204 in response to determining that the visitor is the authorized visitor (at step 5114). Methods may also include refraining from initiating a communication session between the doorbell 202 and a remote computing device 204 in response to determining that the visitor is not an authorized visitor (at step 5116). The term

"authorize" may be understood to mean a guest who has been predetermined to be allowed access to the building.

With reference to Figure 52, determining whether the visitor is the authorized visitor may include determining an identity of the visitor (at step 5200). In some embodiments, determining the identify of the visitor comprises capturing facial recognition data (at step 5202) and determining the identify of the visitor via the facial recognition data (at step 5204). Likewise, determining the identity of the visitor may comprise capturing voice recognition data (at step 5206) and determining the identity of the visitor via the voice recognition data (at step 5208). The system 200 may also be configured to determine the identity of the visitor via any other variety of identification techniques, such as fingerprint recognition, retina detection, and the like.

As shown in Figures 53, the method may include receiving a residence identification in response to a visitor initiating a first communication at a remote building 300 having at least a first residence and a second residence (at step 5300). Methods may also include selecting a first remote computing device 204a associated with the first residence based on the residence identification (at step 5302) and sending a push notification to the first remote computing device 204a in response to receiving the residence identification and selecting the remote computing device 204 (at step 5304).

With continued reference to Figure 53, methods may include receiving the residence identification in response to the visitor pressing a doorbell button 212 to initiate the first communication (at step 5306). Methods may also include receiving the first communication having an Internet protocol address associated with the remote building 300 (at step 5308), identifying a first phone number of the first remote computing device 204a in response to analyzing the Internet protocol address (at step 5310), and sending the push notification to the first phone number (at step 5312).

As shown in Figure 54, the method may include receiving permission from the first remote computing device 204a to unlock an entrance, such as a gate, an outer door, a main door, a door that leads to a common area, and the like, to the remote building 300 at least partially in response to sending an audio message from the visitor to the first remote computing device 204a, and unlocking the entrance (at step 5400). The method may

thereby include unlocking a door of the first residence in response to receiving the permission (at step 5402).

Methods may even include receiving the residence identification having a physical address of the remote building (at step 5404) and determining that the visitor wants access to the first residence in response to data received directly or indirectly from the visitor (at step 5406). Methods may also include identifying a first phone number associated with the first residence (at step 5408) and sending the push notification to the first phone number (at step 5410).

The system 200 may also be configured to receive manual inputs from users of the system 200. As shown in Figure 55, in some embodiments, the method includes receiving permission from the first remote computing device 204a to unlock an entrance to the remote building 300 at least partially in response to sending an audio message from the visitor to the first remote computing device 204a, and unlocking the entrance (at step 5500). Methods may include unlocking a door of the first residence in response to receiving the permission (at step 5502).

Embodiments may also implement voice and facial recognition features. For example, receiving the residence identification may comprise analyzing a recording of the visitor speaking to identify that the visitor wants access to the first residence (at step 5504). Methods may even include receiving a second phone number of a second remote computing device 204b of the visitor at least partially in response to the visitor pressing a doorbell button 212 to initiate the first communication (at step 5506) and initiating a two-way audio communication between the second remote computing device 204b of the visitor and the first remote computing device 204a associated with the first residence (at step 5508). Methods may include receiving authorization from the first remote computing device 204a at least partially in response to the two-way audio communication to send an electronic key data to the second remote computing device 204b via an electronic communication sent via the second phone number (at step 5510).

With reference to Figure 56, methods may also include receiving a second communication in response to a key identification system, such as a doorbell 202, a computer, a sensor, and the like, located at an entrance to the first residence sensing the electronic key data (at step 5600), and sending a third communication to unlock a door of

the first residence in response to receiving the second communication (at step 5602). In some embodiments, the electronic key data is a code configured to enable the visitor to unlock a door of the first residence for a temporary period of time.

Methods may include unlocking a door of the first residence in response to a proximity sensor located at an entrance of the first residence detecting a second remote computing device 204b of the visitor (at step 5604). Even still, in some embodiments, the method includes unlocking a door of the first residence in response to a doorbell located at an entrance of the first residence recognizing at least one of a face of the visitor and a physical characteristic of the first visitor (at step 5606).

Large buildings, such as apartment complexes, often include intercommunication ("intercom") systems. Intercoms can be mounted near an entryway of a building to enable a person who visits the building to communicate with a person inside the building.

In some cases, intercoms are mounted near a door. A visitor can press a button on the intercom to communicate with someone inside the building. For example, the visitor can enter an apartment number or state a person's name. Then, the intercom can initiate two-way audio and/or video communication between the visitor and the person (or a person located in the apartment). The intercom can include a display screen to enable a visitor to see the person in the apartment.

In some cases, intercoms are mounted outside a gate configured to open when a driver of a vehicle uses the intercom to communicate with someone inside the gate and the person inside the gate presses a button to open the gate.

Figure 57 illustrates a diagrammatic view of a visitor 388 trying to communicate with a person 336a inside the building 300. If the person 336a is inside the building 300, then the system can enable the person 336a to communicate via two-way audio and/or two-way video with the visitor 388. For example, the system can include one intercom 519a located near an entryway of the building. The system can include a second intercom 519b located inside a dwelling unit (e.g., an apartment, a hotel room, an office, a place for sleeping, a home, an interior room). A cable 515e or other suitable communication means can couple the intercoms 519a, 519b to enable the visitor 388 to communicate with the person 336a inside the building 300.

A problem arises, however, then the person 336b is away from the building 300. For example, the person 336b might be at work, on vacation, or on a walk. In this case, the system fails to enable the visitor 388 to communicate with the person 336b associated with the dwelling unit.

Figure 58 illustrates a diagrammatic view of a situation that is similar to the situation illustrated in Figure 57 except that a communication device 202 has been communicatively coupled to the system. The communication system 202 can be communicatively coupled (e.g., via wireless networks, cellular networks, the Internet, servers, telephone networks, and/or any suitable communicate system) with a remote computing device 204 of the user 336b. The communication device 202 can comprise any of the components and features described in the context of the doorbells 202 and security systems 202 described herein and/or incorporated by reference. For example, Figure 29 illustrates many features of the communication device 202.

The system can be configured to send alerts (regarding the visitor 388 wanting to talk with a person associated with the dwelling unit) to both the intercom 519b and the remote computing device 204. If a first person 336a located in the dwelling unit answers the alert (e.g., via the intercom 519b) before a second person 336b located away from the dwelling unit answers the alert (e.g., via the remote computing device 204), then the system can terminate the alert to the remote computing device 204 (to avoid alerting more people or locations than may be needed).

If a first person 336b located away from the dwelling unit answers the alert (e.g., via the remote computing device 204) before a second person 336b located in the dwelling unit answers the alert (e.g., via the intercom 519b), then the system can terminate the alert to the intercom 519b (to avoid alerting more people or locations than may be needed).

Figure 59 illustrates a diagrammatic view of the system shown in Figure 57. The intercoms 519a, 519b can comprise microphones 513, 513b configured to record voices; cameras 505, 505b configured to record images of people; speakers 501, 501b configured to emit recorded voices so a remote person can hear the voices; display screens 242, 242b configured to show videos of people located remotely (e.g., to enable two-way video communication); and controls systems 517, 517b that can include computers, printed

circuit boards, wireless communication systems, and any other items necessary to process video, audio, and communications.

The intercoms 519a, 519b can comprise any components and features of intercoms available for sale. For example, Zenitel located in Norway; Visiplex, Inc. located in Buffalo Grove, Illinois; and BEC Integrated Solutions, LLC located in New York sell many intercoms.

Figures 60 and 61 illustrate diagrammatic views of the system shown in Figure 58. Systems can include many intercoms and remote computing devices (e.g., smartphones) that are communicatively coupled by a first communication device 519a and a third communication device 202.

A communication system 207 can be configured to be at least partially coupled to a building 300. The communication system 207 can include a first communication device 519a coupled to the building 300 at a first location (e.g., an entryway 310 of the building 300). The first communication device 519a can comprise a first speaker 501 and a first microphone 513. The communication system 207 can comprise a second communication device 519b coupled to the building 300 at a second location (e.g., inside of room of the building).

The second communication device 519b can comprise a second speaker 501b and a second microphone 513b. The first communication device 519a and the second communication device 519b can be communicatively coupled to enable a visitor 388 located at the first location to talk with a first person 336a at the second location. The communication system 207 can comprise a third communication device 202 that has a portion physically coupled to the first speaker 501 and the first microphone 513. The portion can be electrically coupled to at least one printed circuit board of the first communication device 519a such that the portion can receive data based on sound from the first microphone 513 and can send data such that the first speaker 501 emits sound based on the data from the portion. The portion can be electrically and communicatively coupled with other parts of the third communication device 202.

In some embodiments, the portion of the third communication device 202 is not physically coupled with at least some parts of the third communication device 202 but is wirelessly communicatively coupled with other parts of the third communication device

202. The third communication device 202 can be communicatively coupled to a first remote computing device 204 via wireless communication.

In several embodiments, the third communication device 202 is configured to receive (e.g., via a wireless communication 230) a first audio data recorded by the first remote computing device 204. The portion of the third communication device 202 can be configured to deliver the first audio data to the first speaker 501 via a first electrical connection 515a such that the first speaker 501 emits a first sound based on the first audio data.

The first electrical connection can be a cable, a wire, an interconnect, a part of a printed circuit board, and/or any suitable conductive material that couples the portion of the third communication device 202 to the speaker 501. This coupling can be via the control system 517.

In some embodiments, the third communication device 202 is configured to receive a second audio data recorded by the first communication device 519a. The portion of the third communication device 202 can be configured to receive the second audio data from the first microphone 513 via a second electrical connection 515d. The third communication device 202 can be configured to send the second audio data to the first remote computing device 204 such that the first remote computing device 204 emits a second sound based on the second audio data.

The second electrical connection can be a cable, a wire, an interconnect, a part of a printed circuit board, and/or any suitable conductive material that couples the portion of the third communication device 202 to the microphone 513. This coupling can be via the control system 517.

The camera 505 and the display screen 242 of the first communication device 519a can be electrically coupled to the third communication device 202.

In several embodiments, the first communication device 519a comprises a first camera 505, the third communication device 202 is configured to receive a first video data recorded by the first camera 505, the portion of the third communication device 202 is configured to receive the first video data via a third electrical connection, and/or the third communication device 202 is configured to wirelessly send the first video data to

the first remote computing device 204 such that the first remote computing device 204 displays a first video based on the first video data.

A cable 515e can communicatively couple the first communication device 519a (which can be located in an entryway 310) to the second communication device 519b (which can be located in a room of a building). In some embodiments, a cable 515e is not used to communicatively couple the first communication device 519a to the second communication device 519b. Instead, the first communication device 519a and the second communication device 519b can be communicatively coupled by a wireless network 308 of the building 300.

In some embodiments, the first communication device 519a and the third communication device 202 are located in an entryway 310 of the building 300. The third communication device 202 can be mechanically coupled to the first communication device 519a.

The entryway 310 can be an area near a door of the building 300 or a gate configured to guard an exterior area of the building 300 (e.g., a front yard or a communal area outside of an apartment complex). The second communication device 519b can be located in a dwelling unit inside the building 300. The system 207 can be configured to send a first alert regarding the visitor 388 to the second communication device 519b. The system 207 can be configured to send a second alert regarding the visitor 388 to the first remote computing device 204. In several embodiments, these alerts are sent simultaneously and/or within thirty seconds of each other. The alert signals can be continuous or intermittent. The alerts can comprise information regarding the visitor 388 (e.g., an identity of the visitor 388, the purpose of the visit, an identify of a person with whom the visitor 388 wishes to speak, a time of the visit, package information).

An alert sent to a smartphone can be a push notification. The push notification can cause the smartphone to display a message to a user of the smartphone and/or can cause an “app” to open on the smartphone.

An alert sent to a second communication device 519b can cause a message to display on a display screen 242b of the second communication device 519b and/or can cause the second communication device 519b to emit a notification sound (e.g., a ringing

sound configured to get the attention of an occupant of an apartment, hotel room, or other dwelling unit).

In several embodiments, the system 207 is configured to terminate the first alert in response to detecting that a second person 336b responded to the second alert via the first remote computing device 204.

In some embodiments, the system 207 is configured to send a first alert regarding the visitor 388 to the second communication device 519b, the system 207 is configured to send a second alert regarding the visitor 388 to the first remote computing device 204, and/or the system 207 is configured to terminate the second alert in response to detecting that the first person responded to the first alert via the second communication device 519b.

In several embodiments, the second communication device 519b is located in a dwelling unit inside the building 300. The system 207 can be configured to send an alert regarding the visitor 388 to the first remote computing device 204 in response to detecting that the first remote computing device 204 is not located in dwelling unit.

In some embodiments, the second communication device 519b is located in a dwelling unit inside the building 300. The system 207 can be configured to send an alert regarding the visitor 388 to the first remote computing device 204 in response to determining that the first person is not located in dwelling unit.

In several embodiments, the system 207 comprises a fourth communication device 519c coupled to the building 300 at a third location. The fourth communication device 519c can comprise a third speaker 501c and a third microphone 513c. The first communication device 519a and the fourth communication device 519c can be communicatively coupled to enable the visitor 388 located at the first location to talk with a third person at the third location. The fourth communication device 519c can be communicatively coupled to a second remote computing device 204e via the first communication device 519a and the third communication device 202.

In some embodiments, the third communication device 202 is configured to enable two-way audio communication between the second remote computing device 204e and the first communication device 519a in response to at least one of the first communication device 519a and the third communication device 202 detecting and/or

determining that the visitor 388 wishes to speak with at least one of a dwelling unit in which the fourth communication device 519c is located and an occupant of the dwelling unit in which the fourth communication device 519c is located.

INTERPRETATION

As used herein, the term "substantially" may be understood to mean any of the following phrases: for the most part, essentially, considerably, very much, to a greator significant extent.

As used herein, the terms "resident", "occupant", "guest", and "visitor" may be used interchangeably and may be understood to mean any person who enters a building.

None of the steps described herein is essential or indispensable. Any of the steps can be adjusted or modified. Other or additional steps can be used. Any portion of any of the steps, processes, structures, and/or devices disclosed or illustrated in one embodiment, flowchart, or example in this specification can be combined or used with or instead of any other portion of any of the steps, processes, structures, and/or devices disclosed or illustrated in a different embodiment, flowchart, or example. The embodiments and examples provided herein are not intended to be discrete and separate from each other.

The section headings and subheadings provided herein are nonlimiting. The section headings and subheadings do not represent or limit the full scope of the embodiments described in the sections to which the headings and subheadings pertain. For example, a section titled "Topic 1" may include embodiments that do not pertain to Topic 1 and embodiments described in other sections may apply to and be combined with embodiments described within the "Topic 1" section.

Some of the devices, systems, embodiments, and processes use computers. Each of the routines, processes, methods, and algorithms described in the preceding sections may be embodied in, and fully or partially automated by, code modules executed by one or more computers, computer processors, or machines configured to execute computer instructions. The code modules may be stored on any type of non-transitory computer-readable storage medium or tangible computer storage device, such as hard drives, solid state memory, flash memory, optical disc, and/or the like. The processes and algorithms

may be implemented partially or wholly in application-specific circuitry. The results of the disclosed processes and process steps may be stored, persistently or otherwise, in any type of non-transitory computer storage such as, e.g., volatile or non-volatile storage.

The various features and processes described above may be used independently of one another, or may be combined in various ways. All possible combinations and subcombinations are intended to fall within the scope of this disclosure. In addition, certain method, event, state, or process blocks may be omitted in some implementations. The methods, steps, and processes described herein are also not limited to any particular sequence, and the blocks, steps, or states relating thereto can be performed in other sequences that are appropriate. For example, described tasks or events may be performed in an order other than the order specifically disclosed. Multiple steps may be combined in a single block or state. The example tasks or events may be performed in serial, in parallel, or in some other manner. Tasks or events may be added to or removed from the disclosed example embodiments. The example systems and components described herein may be configured differently than described. For example, elements may be added to, removed from, or rearranged compared to the disclosed example embodiments.

Conditional language used herein, such as, among others, "can," "could," "might," "may," "e.g.," and the like, unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or steps. Thus, such conditional language is not generally intended to imply that features, elements and/or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without author input or prompting, whether these features, elements and/or steps are included or are to be performed in any particular embodiment. The terms "comprising," "including," "having," and the like are synonymous and are used inclusively, in an open-ended fashion, and do not exclude additional elements, features, acts, operations and so forth. Also, the term "or" is used in its inclusive sense (and not in its exclusive sense) so that when used, for example, to connect a list of elements, the term "or" means one, some, or all of the elements in the list. Conjunctive language such as the phrase "at least one of X, Y, and Z," unless specifically stated otherwise, is otherwise understood with the context as used

in general to convey that an item, term, etc. may be either X, Y, or Z. Thus, such conjunctive language is not generally intended to imply that certain embodiments require at least one of X, at least one of Y, and at least one of Z to each be present.

The term "and/or" means that "and" applies to some embodiments and "or" applies to some embodiments. Thus, A, B, and/or C can be replaced with A, B, and C written in one sentence and A, B, or C written in another sentence. A, B, and/or C means that some embodiments can include A and B, some embodiments can include A and C, some embodiments can include B and C, some embodiments can only include A, some embodiments can include only B, some embodiments can include only C, and some embodiments include A, B, and C. The term "and/or" is used to avoid unnecessary redundancy.

While certain example embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions disclosed herein. Thus, nothing in the foregoing description is intended to imply that any particular feature, characteristic, step, module, or block is necessary or indispensable. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions, and changes in the form of the methods and systems described herein may be made without departing from the spirit of the inventions disclosed herein.

THE FOLLOWING IS CLAIMED:

1. A communication system configured to be at least partially coupled to a building, the system comprising:

a first communication device coupled to the building at a first location, the first communication device comprising a first speaker and a first microphone;

a second communication device coupled to the building at a second location, the second communication device comprising a second speaker and a second microphone, wherein the first and second communication devices are communicatively coupled to enable a visitor located at the first location to talk with a first person at the second location; and

a third communication device having a portion physically coupled to the first speaker and the first microphone, wherein the third communication device is communicatively coupled to a first remote computing device via wireless communication.

2. The system of Claim 1, wherein the third communication device is configured to receive a first audio data recorded by the first remote computing device, and the portion is configured to deliver the first audio data to the first speaker via a first electrical connection such that the first speaker emits a first sound based on the first audio data.

3. The system of Claim 2, wherein the third communication device is configured to receive a second audio data recorded by the first communication device, the portion is configured to receive the second audio data from the first microphone via a second electrical connection, and the third communication device is configured to send the second audio data to the first remote computing device such that the first remote computing device emits a second sound based on the second audio data.

4. The system of Claim 3, wherein the first communication device comprises a first camera, the third communication device is configured to receive a first video data recorded by the first camera, the portion is configured to receive the first video data via a

third electrical connection, and the third communication device is configured to wirelessly send the first video data to the first remote computing device such that the first remote computing device displays a first video based on the first video data.

5. The system of Claim 1, wherein the first and third communication devices are located in an entryway of the building.

6. The system of Claim 5, wherein the second communication device is located in a dwelling unit inside the building.

7. The system of Claim 6, wherein the system is configured to send a first alert regarding the visitor to the second communication device.

8. The system of Claim 7, wherein the system is configured to send a second alert regarding the visitor to the first remote computing device.

9. The system of Claim 8, wherein the system is configured to terminate the first alert in response to detecting that a second person responded to the second alert via the first remote computing device.

10. The system of Claim 1, wherein the system is configured to send a first alert regarding the visitor to the second communication device, the system is configured to send a second alert regarding the visitor to the first remote computing device, and the system is configured to terminate the second alert in response to detecting that the first person responded to the first alert via the second communication device.

11. The system of Claim 1, wherein the second communication device is located in a dwelling unit inside the building, wherein the system is configured to send an alert regarding the visitor to the first remote computing device in response to detecting that the first remote computing device is not located in dwelling unit.

12. The system of Claim 1, wherein the second communication device is located in a dwelling unit inside the building, wherein the system is configured to send an alert regarding the visitor to the first remote computing device in response to determining that the first person is not located in dwelling unit.

13. The system of Claim 1, further comprising a fourth communication device coupled to the building at a third location, the fourth communication device comprising a third speaker and a third microphone, wherein the first and fourth communication devices are communicatively coupled to enable the visitor located at the first location to talk with a third person at the third location.

14. The system of Claim 13, wherein the fourth communication device is communicatively coupled to a second remote computing device via the first and third communication devices.

15. The system of Claim 14, wherein the third communication device is configured to enable two-way audio communication between the second remote computing device and the first communication device in response to at least one of the first communication device and the third communication device detecting that the visitor wishes to speak with at least one of a dwelling unit in which the fourth communication device is located and an occupant of the dwelling unit in which the fourth communication device is located.

16. A doorbell system configured to be coupled to a building, the system comprising:

a remote computing device;

a doorbell coupled to the building and communicatively coupled to the remote computing device, the doorbell comprising a camera configurable to capture images, a microphone configurable to receive audio, and a button configurable to be pressed by a visitor to notify an occupant of the building; and

a lock coupled to the building and communicatively coupled to at least one of the doorbell and the remote computing device, the lock configurable to be locked and unlocked in response to an input received by the remote computing device.

17. The system of Claim 16, wherein the building is a multi-unit building and the lock is a main lock coupled adjacent to a main entrance of the building, the system further comprising a first lock coupled to a first door of a first apartment unit within the building and communicatively coupled to at least one of the doorbell and the remote computing device, the first lock configurable to be locked and unlocked in response to a second input received by the remote computing device.

18. The system of Claim 17, wherein the remote computing device is a first remote computing device, the system further comprising:

a second remote computing device communicatively coupled to the doorbell; and

a second lock coupled to a second door of a second apartment unit within the building and communicatively coupled to at least one of the doorbell and the second remote computing device, the second lock configurable to be locked and unlocked in response to a third input received by the second remote computing device.

19. The system of Claim 17, further comprising a remote server communicatively coupled to at least one of the remote computing device, the doorbell, the first lock, and the second lock, wherein the server is configurable to store a plurality of internet protocol addresses and thereby determine a location of the doorbell based upon an internet protocol address of the doorbell.

20. The system of Claim 19, wherein the server is further configurable to store voice data and thereby determine an identity of the visitor based upon the audio received by the microphone.

21. The system of Claim 17, wherein the main lock defines a first form factor and the first lock defines a second form factor.

22. The system of Claim 21, wherein the first form factor and the second form factor are substantially identical.

23. The system of Claim 21, wherein the first form factor and the second form factor are different.

24. The system of Claim 16, wherein the doorbell system is arranged and configured to capture facial recognition data and determine an identity of the visitor based on the facial recognition data.

25. The system of Claim 16, wherein the doorbell system is arranged and configured to capture voice recognition data and determine an identity of the visitor based on the voice recognition data.

26. A method of using a doorbell system to enable an occupant to grant a visitor access to a building, the method comprising:

determining, via the doorbell system, an indication of a presence of the visitor;

determining, via a remote server communicatively coupled to the doorbell system, a location of the doorbell system based upon an Internet protocol address of the doorbell system; and

unlocking a lock of the doorbell system.

27. The method of Claim 26, further comprising receiving, via a microphone of the doorbell system, an audible message from the visitor.

28. The method of Claim 26, further comprising determining whether the visitor is an authorized visitor.

29. The method of Claim 28, further comprising automatically unlocking the lock in response to determining that the visitor is the authorized visitor.

30. The method of Claim 28, further comprising automatically locking the lock in response to determining that the visitor is not the authorized visitor.

31. The method of Claim 28, wherein determining whether the visitor is the authorized visitor comprises determining an identity of the visitor.

32. The method of Claim 31, wherein determining the identify of the visitor comprises capturing facial recognition data and determining the identify of the visitor via the facial recognition data.

33. The method of Claim 31, wherein determining the identity of the visitor comprises capturing voice recognition data and determining the identity of the visitor via the voice recognition data.

34. The method of Claim 28, further comprising initiating a communication session between the doorbell and a remote computing device in response to determining that the visitor is the authorized visitor.

35. The method of Claim 28, further comprising refraining from initiating a communication session between the doorbell and a remote computing device in response to determining that the visitor is not the authorized visitor.

36. A method of using a doorbell system, the method comprising:

receiving a residence identification in response to a visitor initiating a first communication at a remote building having at least a first residence and a second residence;

selecting a first remote computing device associated with the first residence based on the residence identification; and

sending a push notification to the first remote computing device in response to receiving the residence identification and selecting the remote computing device.

37. The method of Claim 36, further comprising receiving the residence identification in response to the visitor pressing a doorbell button to initiate the first communication.

38. The method of Claim 37, further comprising receiving the first communication having an Internet protocol address associated with the remote building, identifying a first phone number of the first remote computing device in response to analyzing the Internet protocol address, and sending the push notification to the first phone number.

39. The method of Claim 38, further comprising receiving permission from the first remote computing device to unlock an entrance to the remote building at least partially in response to sending an audio message from the visitor to the first remote computing device, and unlocking the entrance.

40. The method of Claim 39, further comprising unlocking a door of the first residence in response to receiving the permission.

41. The method of Claim 37, further comprising receiving the residence identification having a physical address of the remote building, determining that the visitor wants access to the first residence in response to data received directly or indirectly from the visitor, identifying a first phone number associated with the first residence, and sending the push notification to the first phone number.

42. The method of Claim 41, further comprising receiving permission from the first remote computing device to unlock an entrance to the remote building at least partially in response to sending an audio message from the visitor to the first remote computing device, and unlocking the entrance.

43. The method of Claim 42, further comprising unlocking a door of the first residence in response to receiving the permission.

44. The method of Claim 36, wherein receiving the residence identification comprises analyzing a recording of the visitor speaking to identify that the visitor wants access to the first residence.

45. The method of Claim 36, further comprising receiving a second phone number of a second remote computing device of the visitor at least partially in response to the visitor pressing a doorbell button to initiate the first communication, initiating a two-way audio communication between the second remote computing device of the visitor and the first remote computing device associated with the first residence, receiving authorization from the first remote computing device at least partially in response to the two-way audio communication to send an electronic key data to the second remote computing device via an electronic communication sent via the second phone number.

46. The method of Claim 45, further comprising receiving a second communication in response to a key identification system located at an entrance to the first residence sensing the electronic key data, and sending a third communication to unlock a door of the first residence in response to receiving the second communication.

47. The method of Claim 45, wherein the electronic key data is a code configured to enable the visitor to unlock a door of the first residence for a temporary period of time.

48. The method of Claim 36, further comprising unlocking a door of the first residence in response to a proximity sensor located at an entrance of the first residence detecting a second remote computing device of the visitor.

49. The method of Claim 36, further comprising unlocking a door of the first residence in response to a doorbell located at an entrance of the first residence recognizing at least one of a face of the visitor and a physical characteristic of the first visitor.

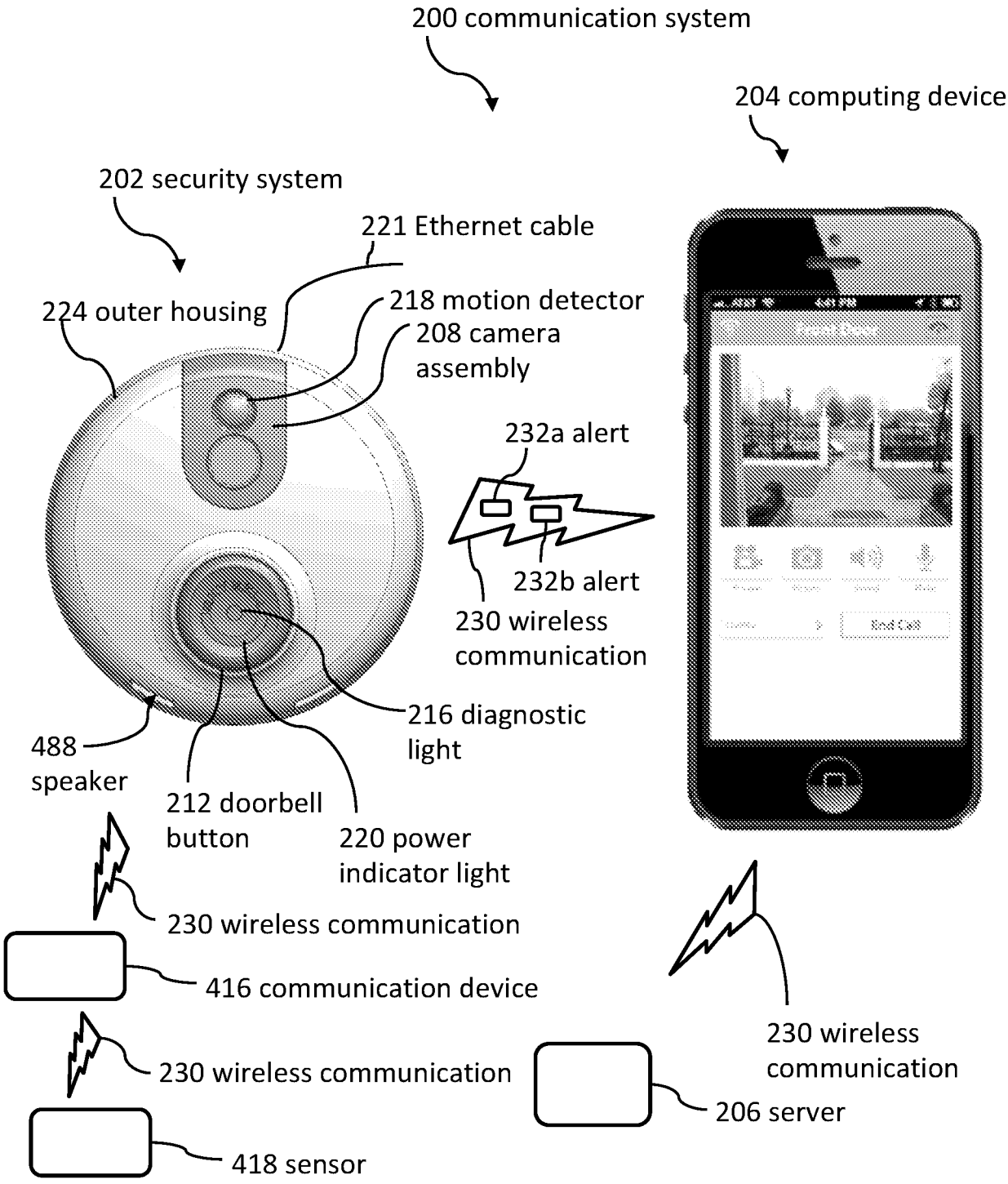
200 communication system
204 computing device
202 security system
221 Ethernet cable
224 outer housing
218 motion detector
208 camera assembly
232a alert
232b alert
230 wireless communication
216 diagnostic light
488 speaker
212 doorbell button
220 power indicator light
230 wireless communication
416 communication device
230 wireless communication
418 sensor
230 wireless communication
206 server

**Figure 1**

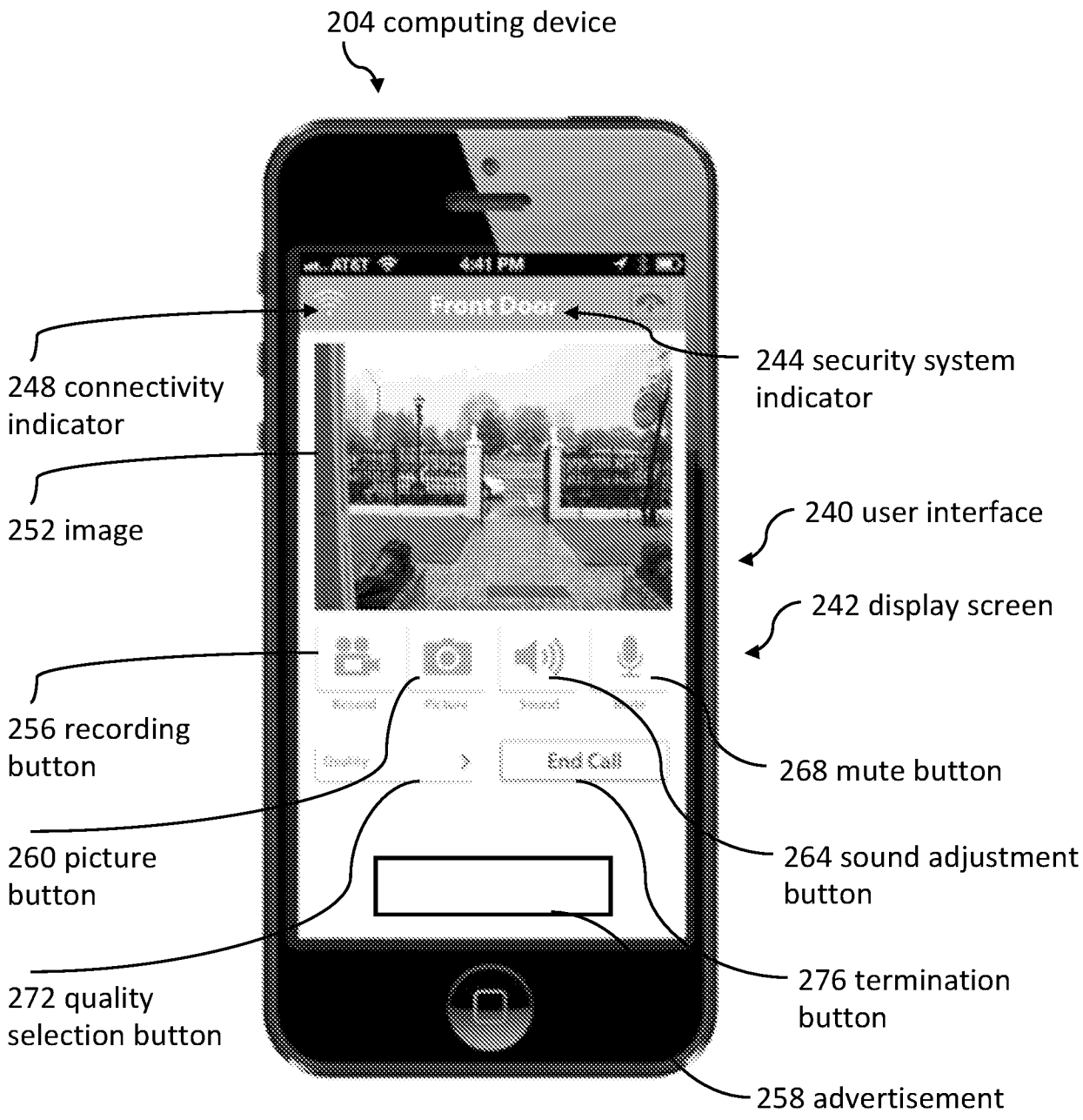
204 computing device
248 connectivity indicator
252 image
256 recording button
260 picture button
272 quality selection button
244 security system indicator
240 user interface
242 display screen
268 mute button
264 sound adjustment button
276 termination button
258 advertisement
Front Door
End Call

**Figure 2**

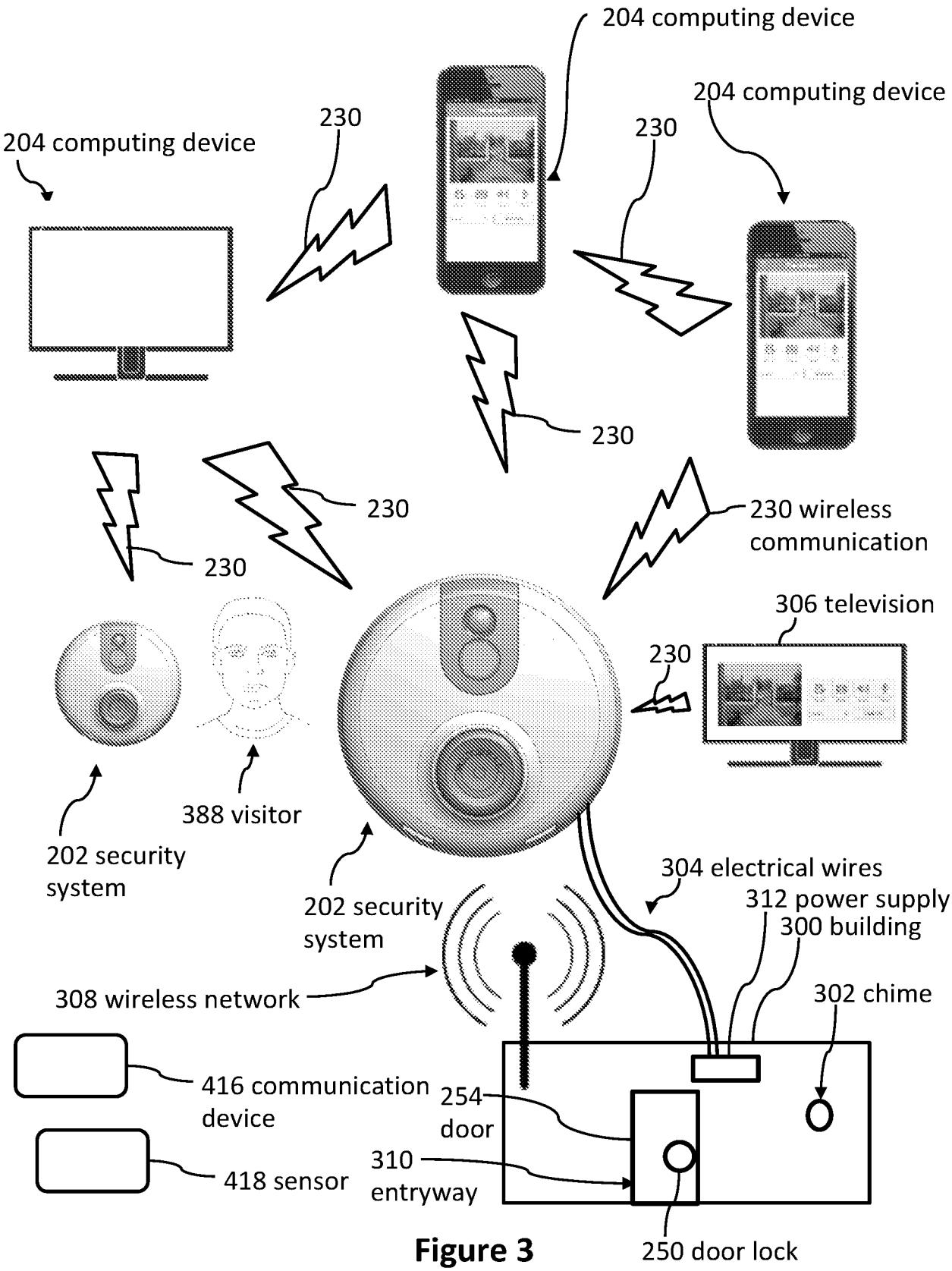
204 computing device
204 computing device
204 computing device
230
230
230
230
230
230
230 wireless communication
306 television
230
388 visitor
202 security system
202 security system
304 electrical wires
312 power supply
300 building
308 wireless network
302 chime
416 communication device
418 sensor
254 door
310 entryway
250 door lock

**Figure 3**

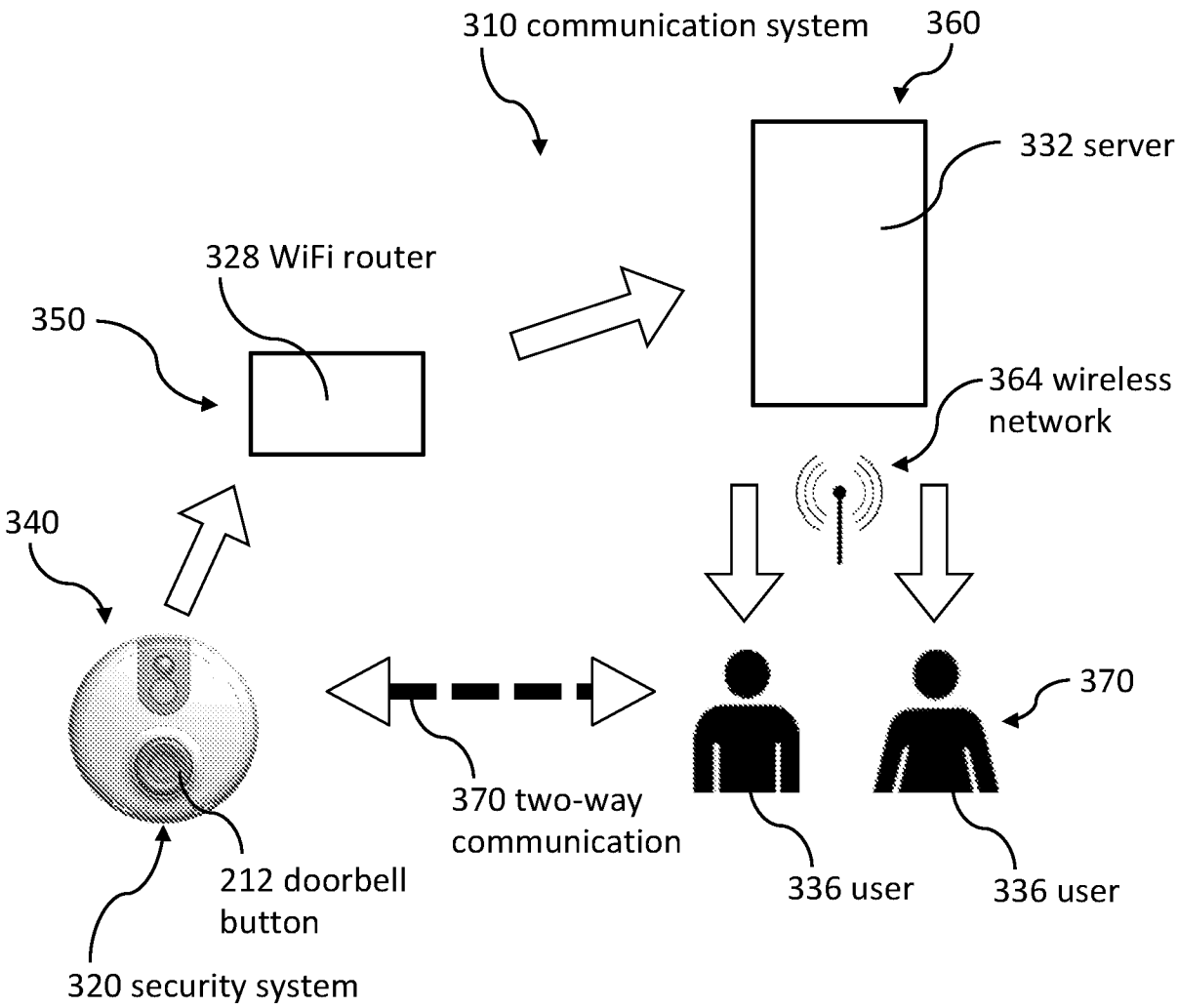
310 communication system
360
332 server
328 WiFi router
350
364 wireless network
340
370
370 two-way communication
212 doorbell button
336 user
336 user
320 security system

**Figure 4**

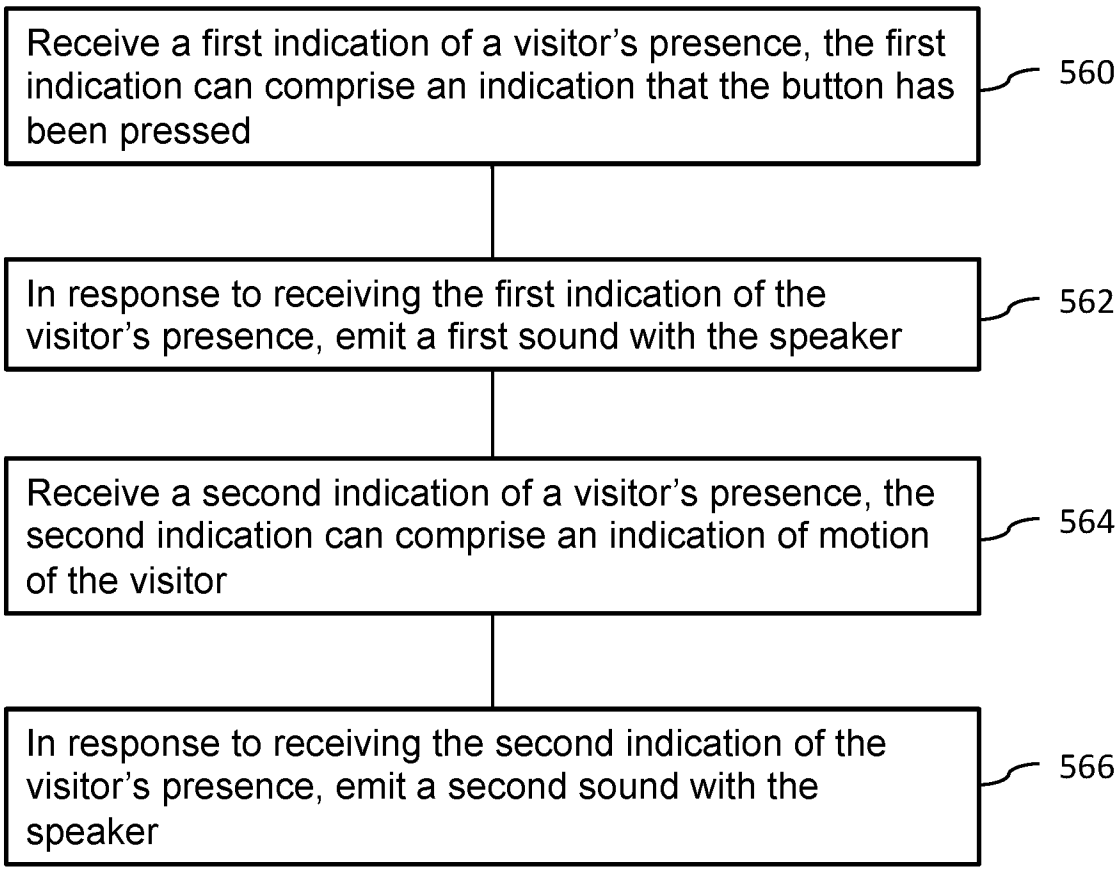
Receive a first indication of a visitor's presence, the first indication can comprise an indication that the button has been pressed
560
In response to receiving the first indication of the visitor's presence, emit a first sound with the speaker
562
Receive a second indication of a visitor's presence, the second indication can comprise an indication of motion of the visitor
564
In response to receiving the second indication of the visitor's presence, emit a second sound with the speaker
566

**Figure 5**

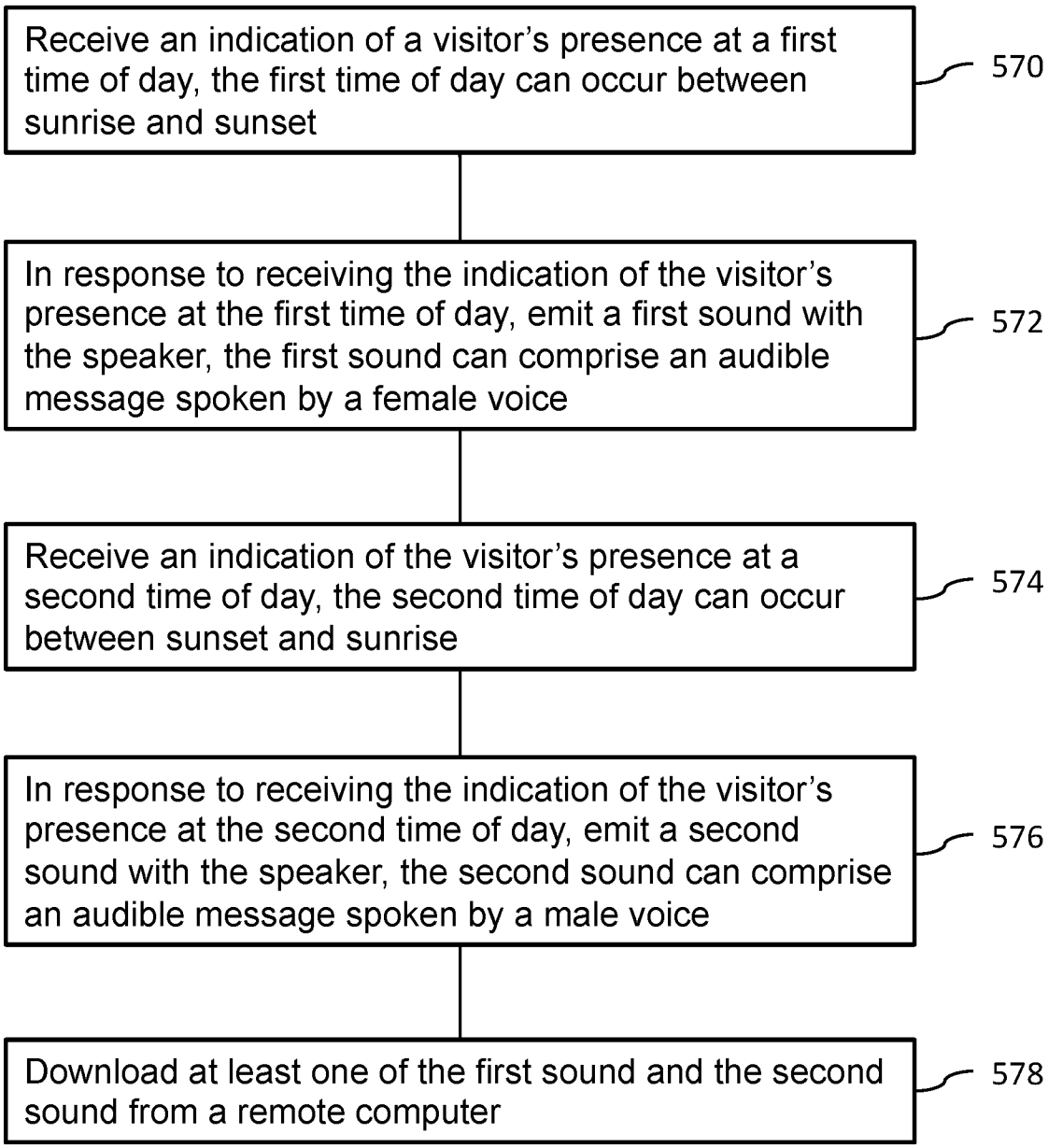
Receive an indication of a visitor's presence at a first time of day, the first time of day can occur between sunrise and sunset
570
In response to receiving the indication of the visitor's presence at the first time of day, emit a first sound with the speaker, the first sound can comprise an audible message spoken by a female voice
572
Receive an indication of the visitor's presence at a second time of day, the second time of day can occur between sunset and sunrise
574
In response to receiving the indication of the visitor's presence at the second time of day, emit a second sound with the speaker, the second sound can comprise an audible message spoken by a male voice
576
Download at least one of the first sound and the second sound from a remote computer
578

**Figure 6**

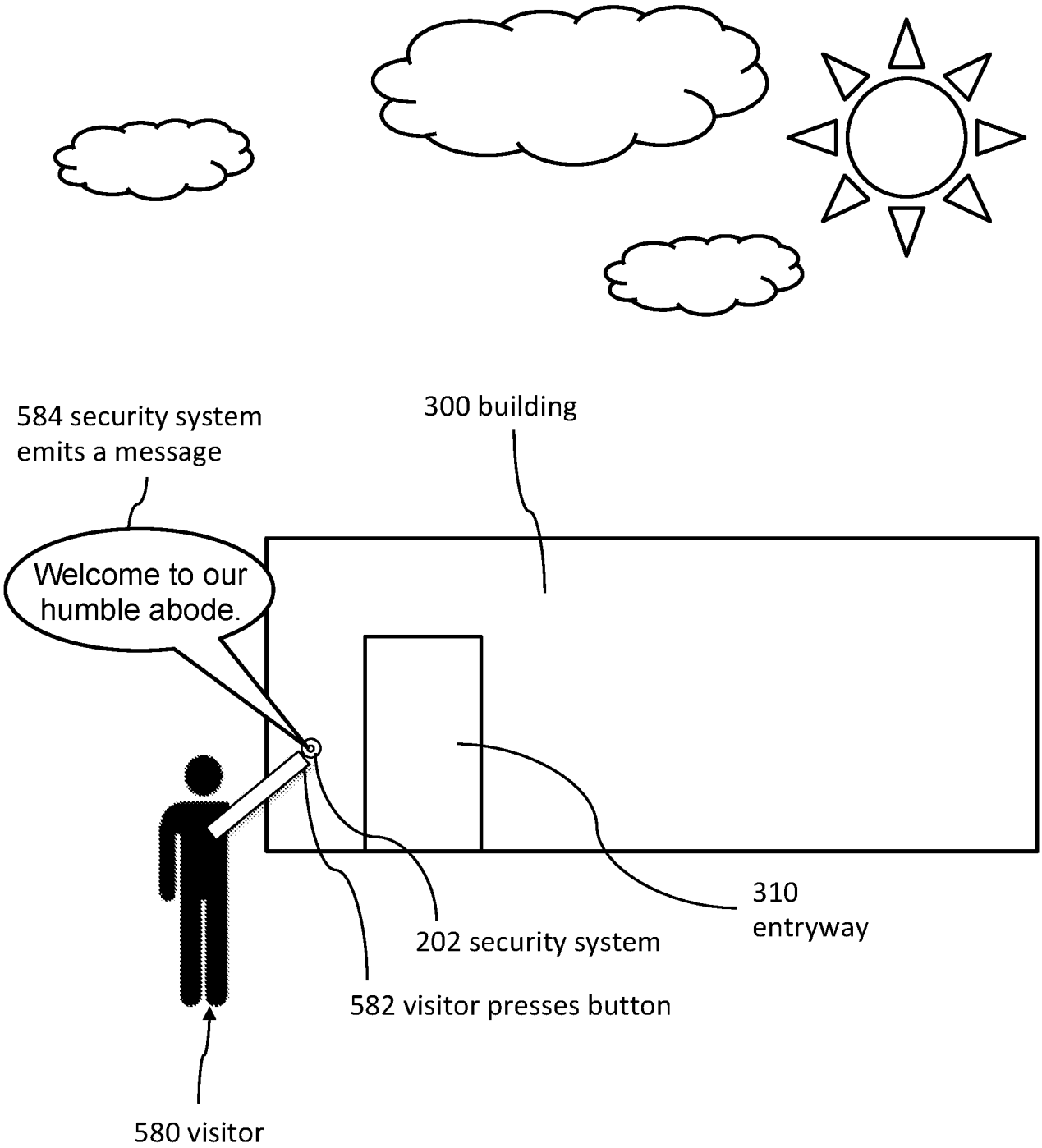
584 security system emits a message
300 building
Welcome to our humble abode.
310 entryway
202 security system
582 visitor presses button
580 visitor

**Figure 7**

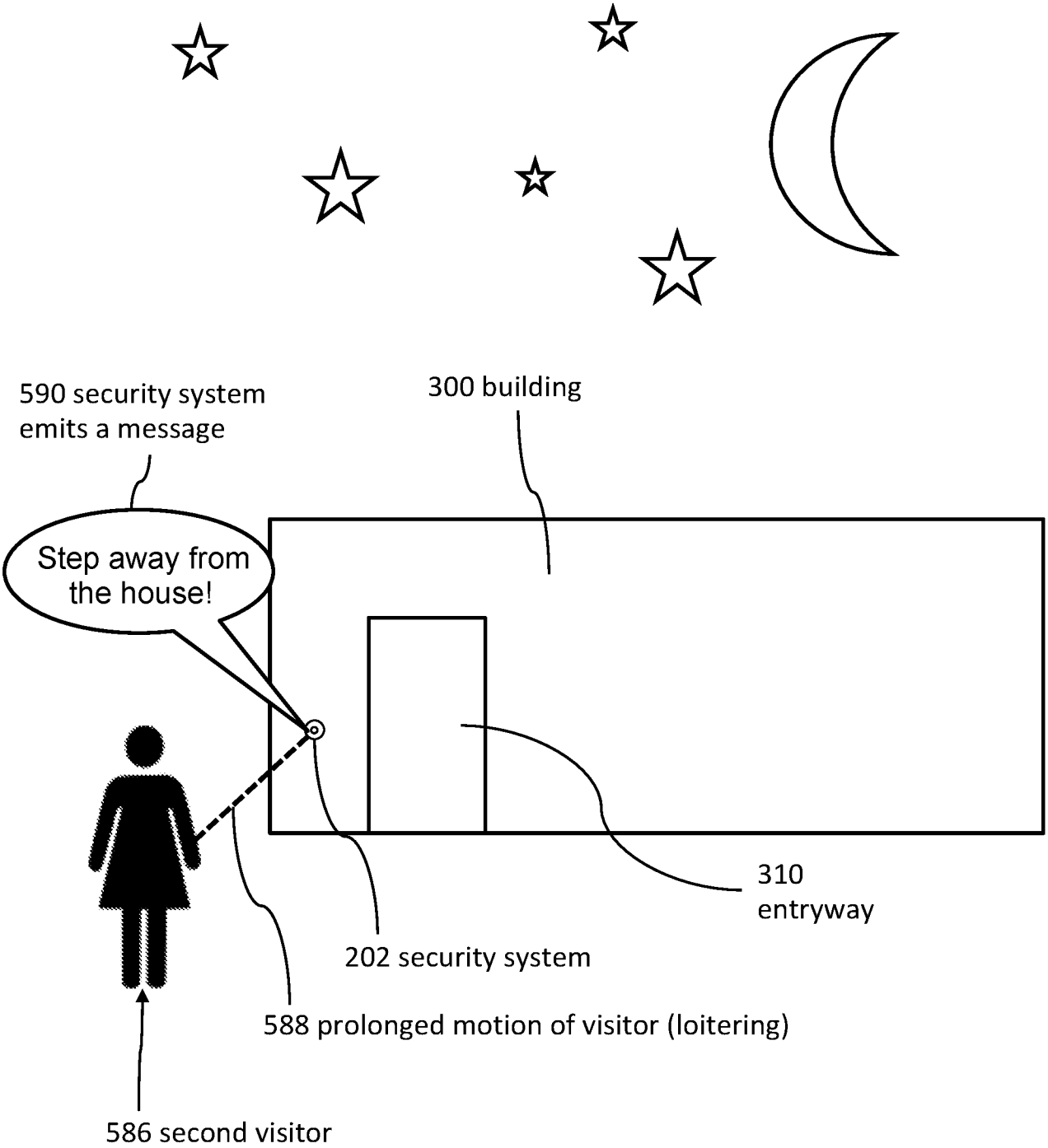
590 security system
emits a message
300 building
Step away from
the house!
310
entryway
202 security system
588 prolonged motion of visitor (loitering)
586 second visitor

**Figure 8**

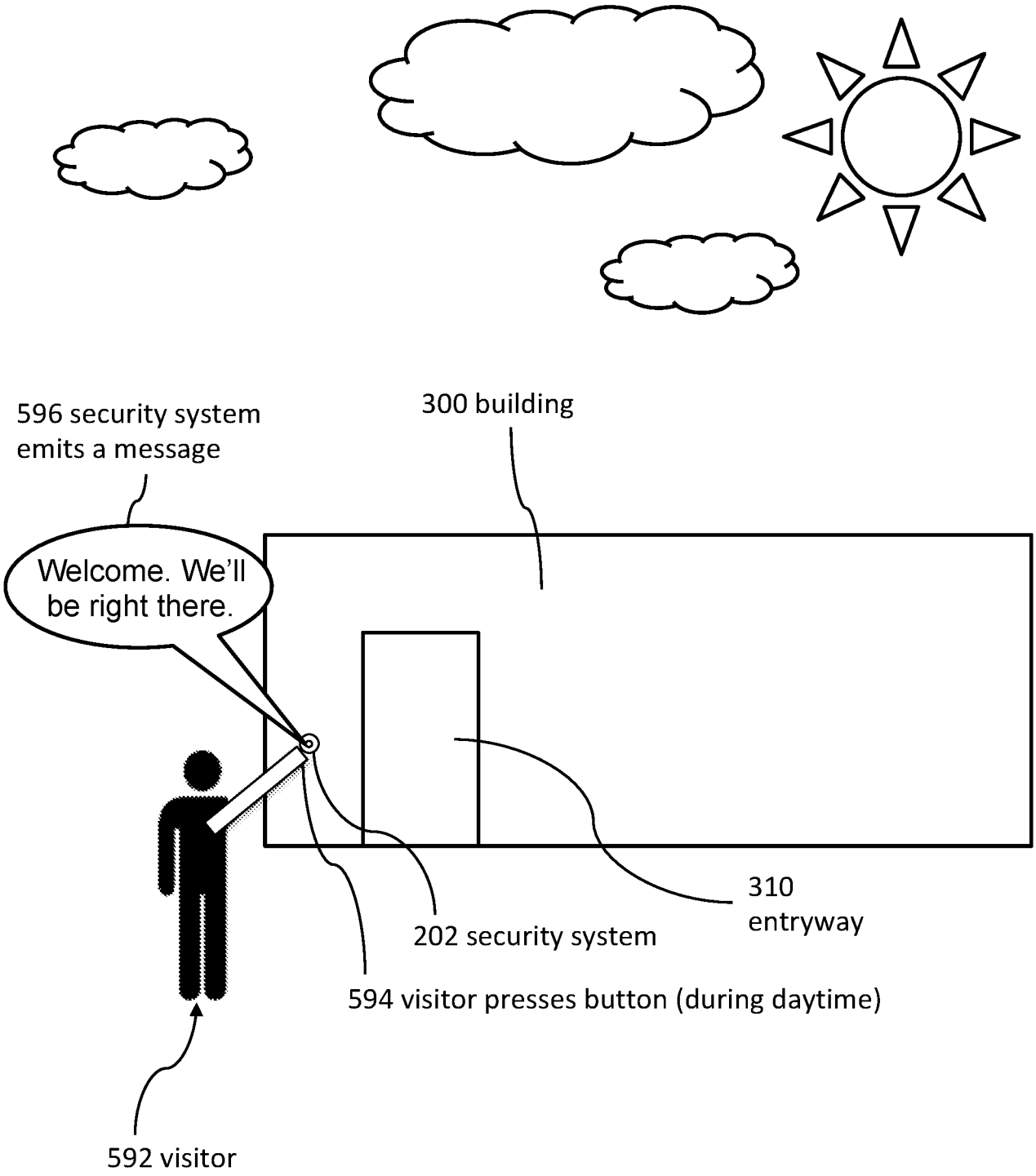
596 security system emits a message
300 building
Welcome. We'll be right there.
310 entryway
202 security system
594 visitor presses button (during daytime)
592 visitor

**Figure 9**

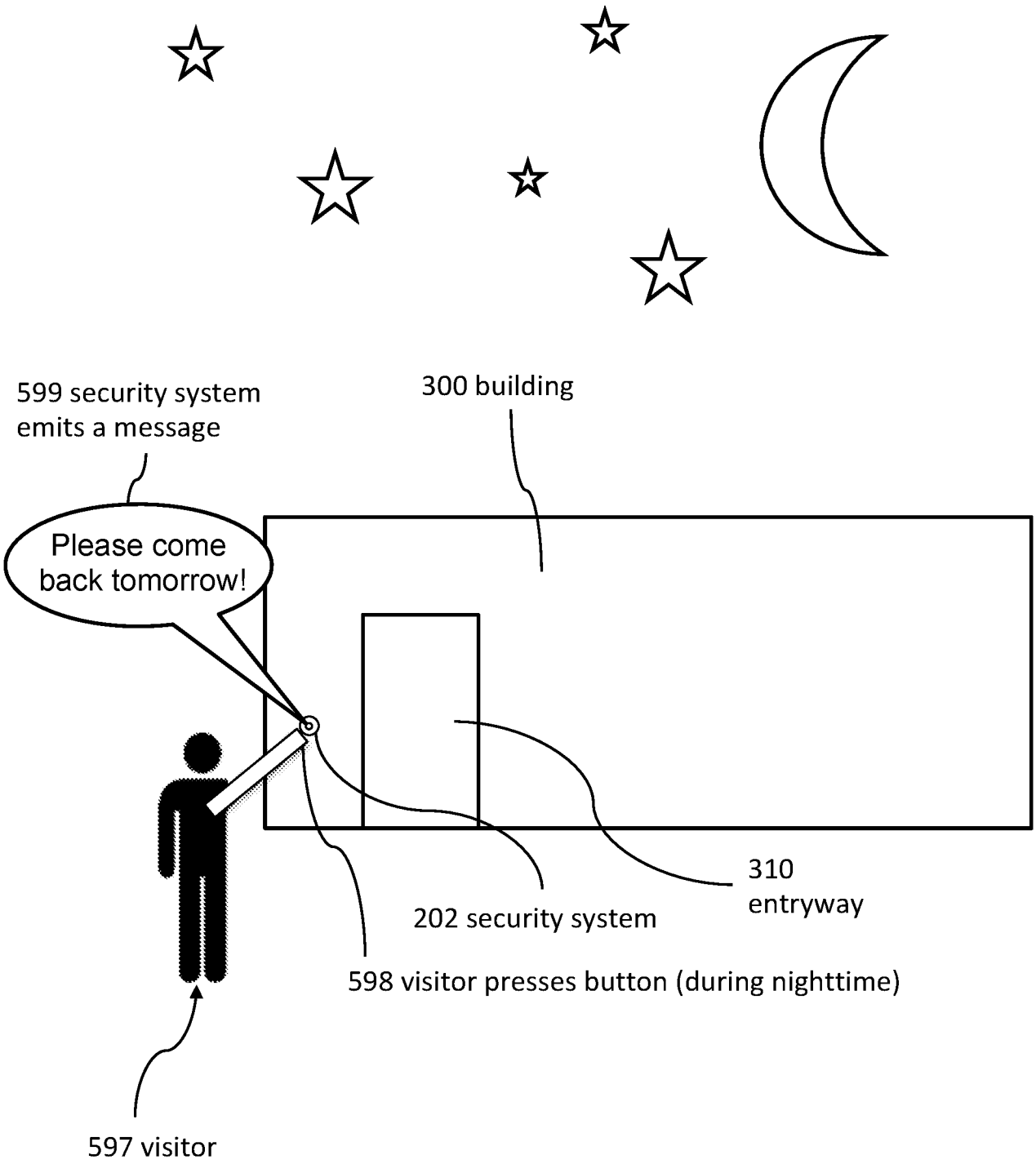
599 security system
emits a message
300 building
Please come
back tomorrow!
310
entryway
202 security system
598 visitor presses button (during nighttime)
597 visitor

**Figure 10**

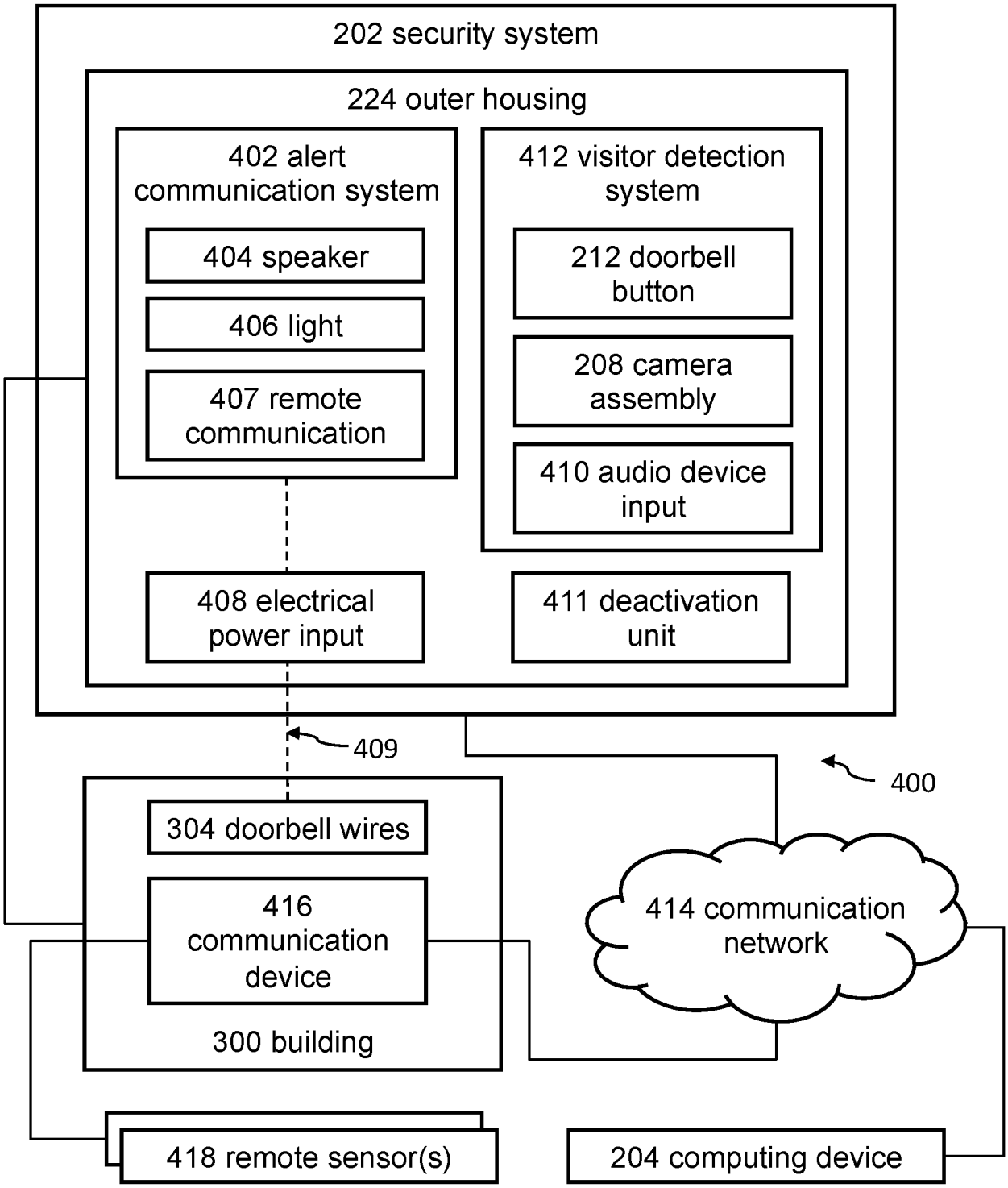
202 security system
224 outer housing
402 alert communication system
404 speaker
406 light
407 remote communication
412 visitor detection system
212 doorbell button
208 camera assembly
410 audio device input
408 electrical power input
411 deactivation unit
409
400
304 doorbell wires
416 communication device
300 building
414 communication network
418 remote sensor(s)
204 computing device

**Figure 11**

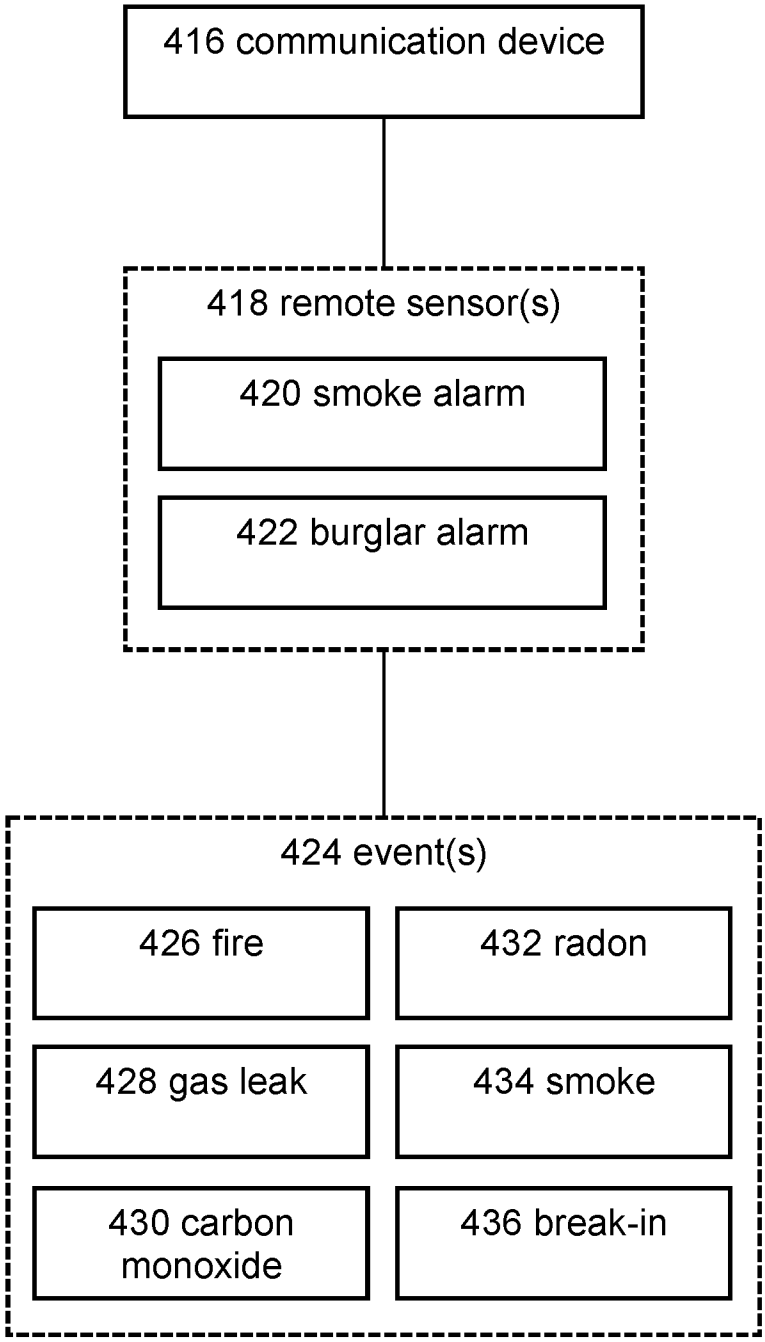
416 communication device
418 remote sensor(s)
420 smoke alarm
422 burglar alarm
424 event(s)
426 fire
432 radon
428 gas leak
434 smoke
430 carbon monoxide
436 break-in

**Figure 12**

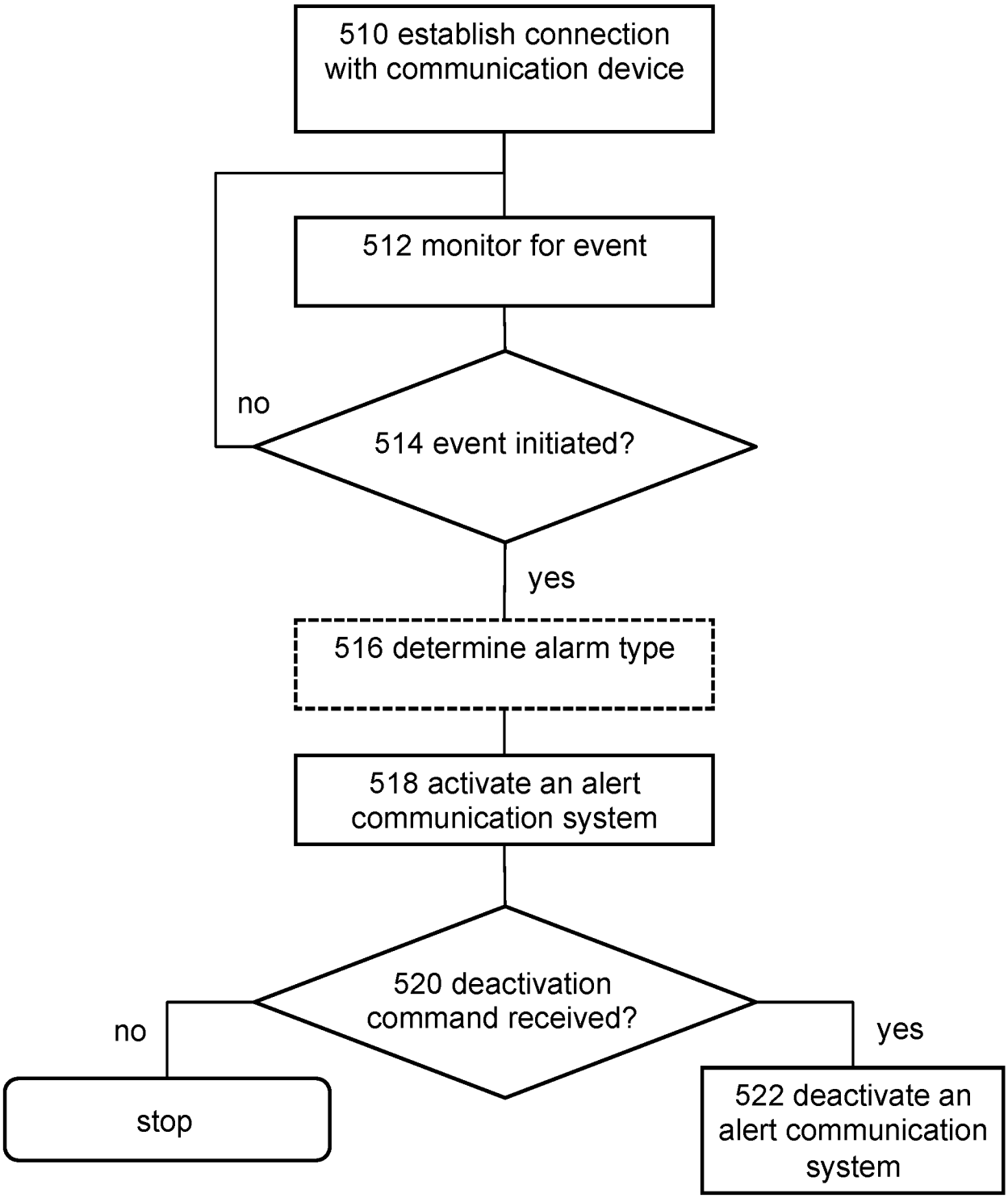
510 establish connection with communication device
512 monitor for event
514 event initiated?
no
yes
516 determine alarm type
518 activate an alert communication system
520 deactivation command received?
no
yes
stop
522 deactivate an alert communication system

**Figure 13**

600 table

| type of event | certainty | severity | alarm type |
|---|---|---|---|
| fire | 20% | high | sound |
| gas leak | 50% | high | red flash w/ sound |
| glass breaking | 80% | medium | white light |
| baby crying | 95% | low | play music |

**Figure 14**

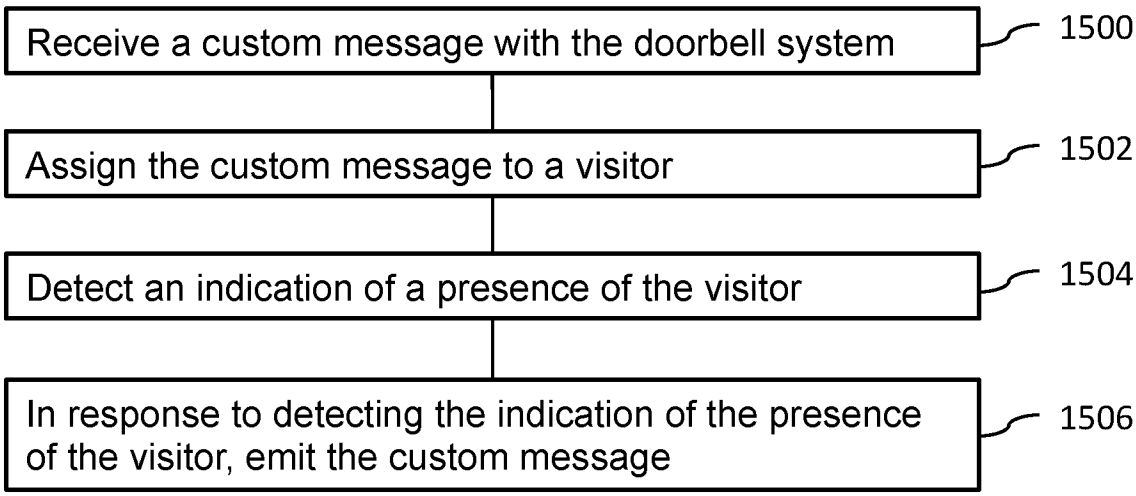


**Figure 15**

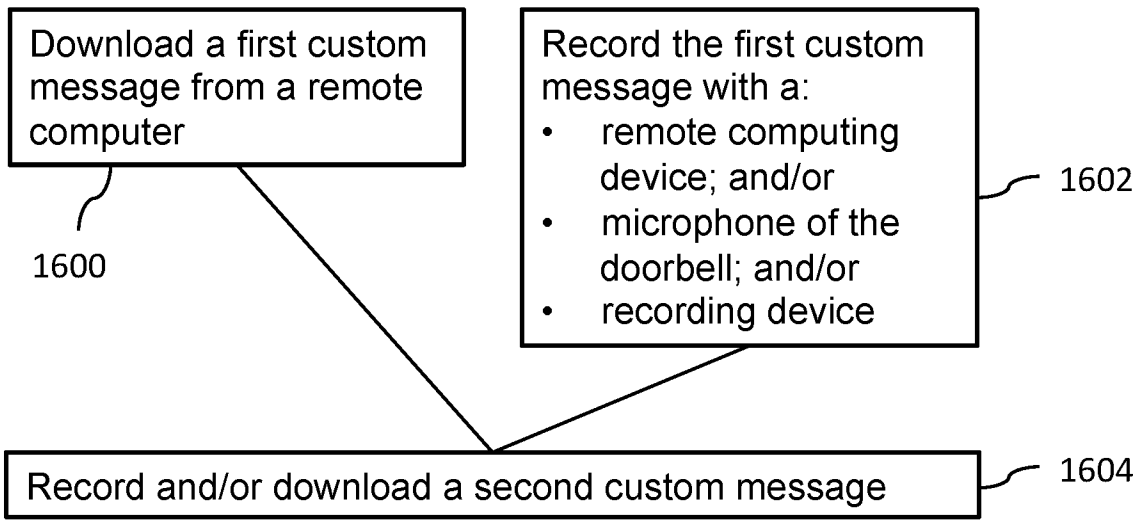


**Figure 16**

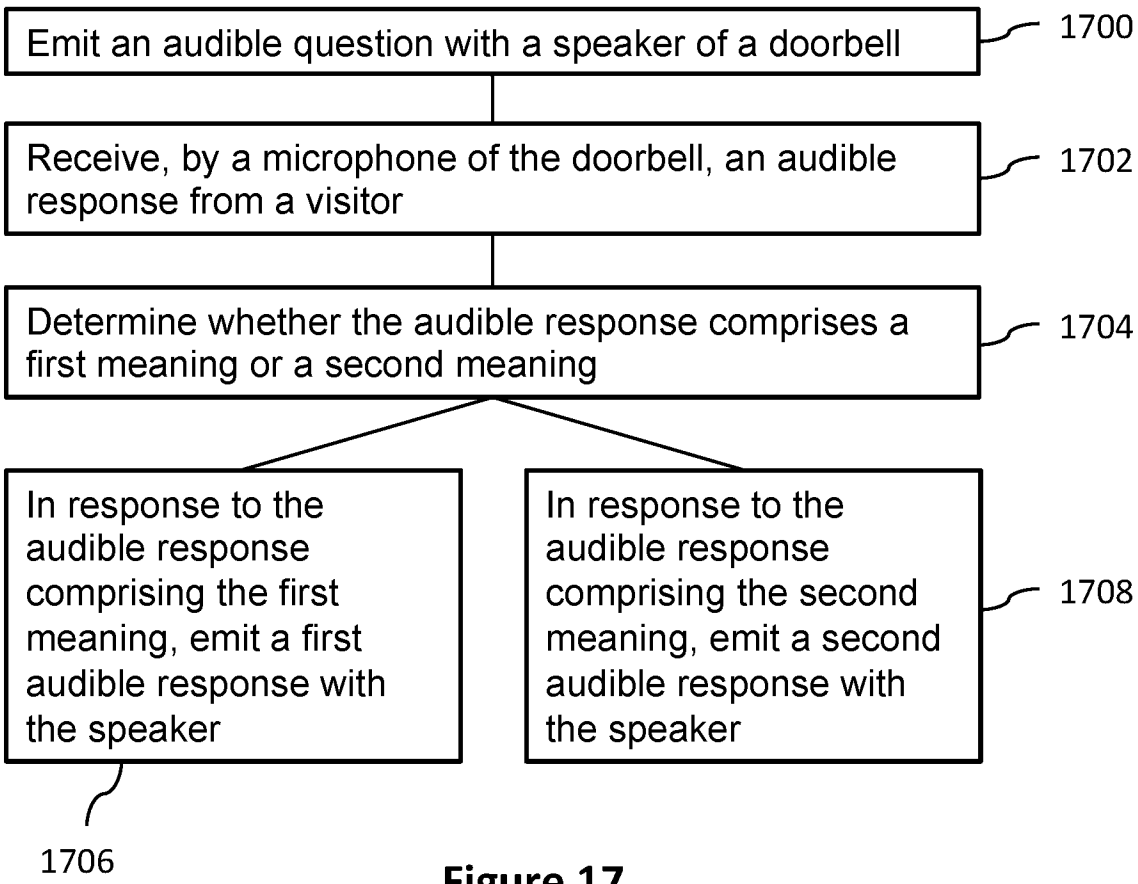


**Figure 17**

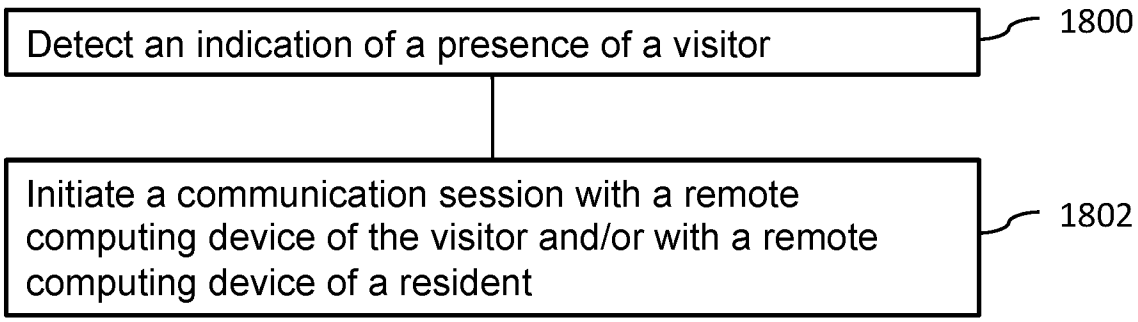


**Figure 18**

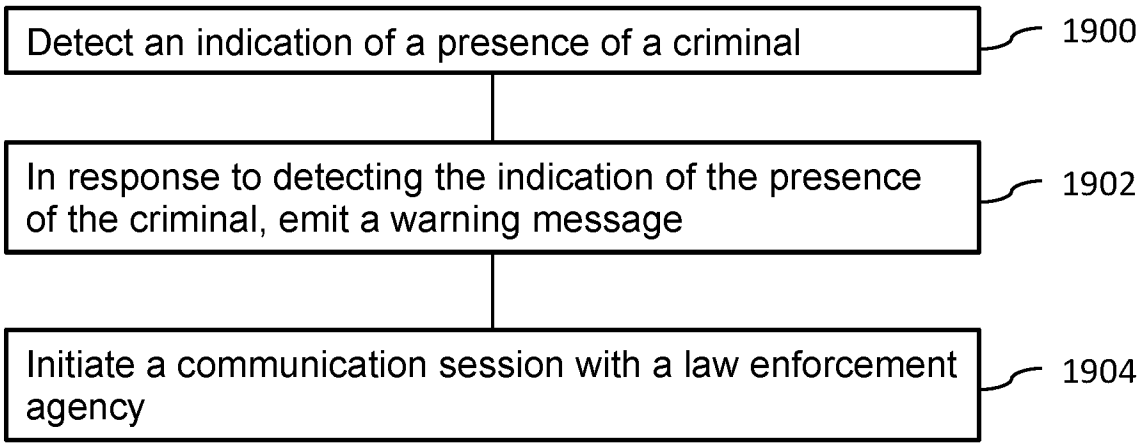


**Figure 19**

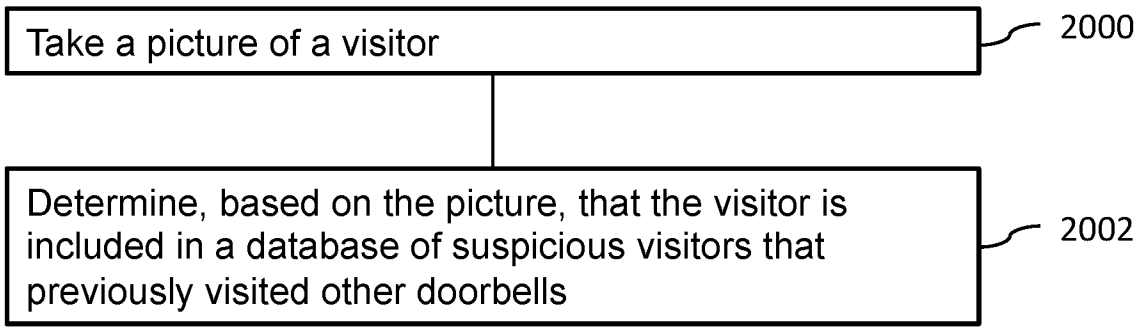


**Figure 20**

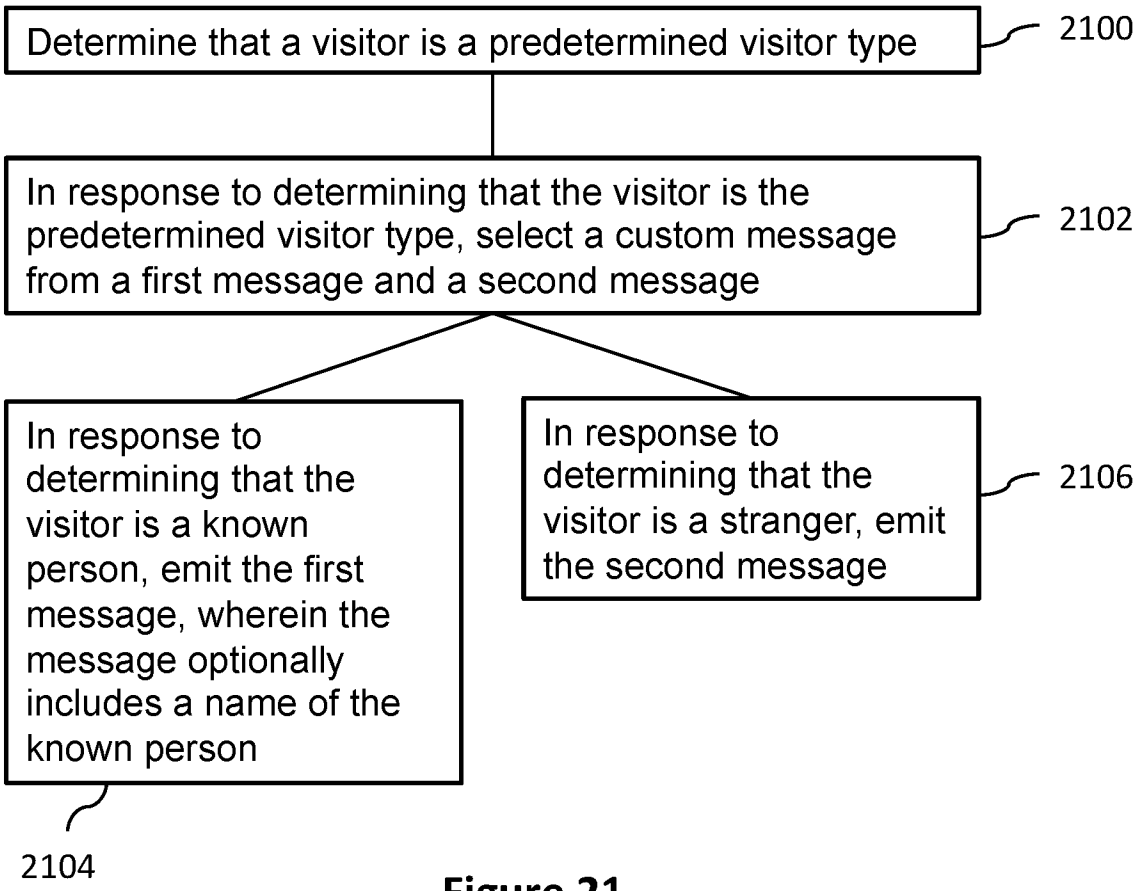


**Figure 21**

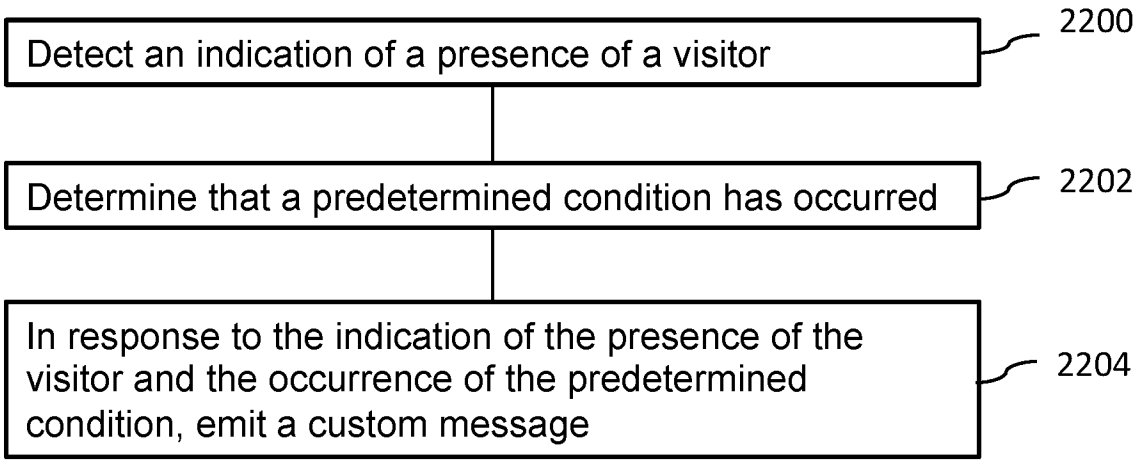


**Figure 22**

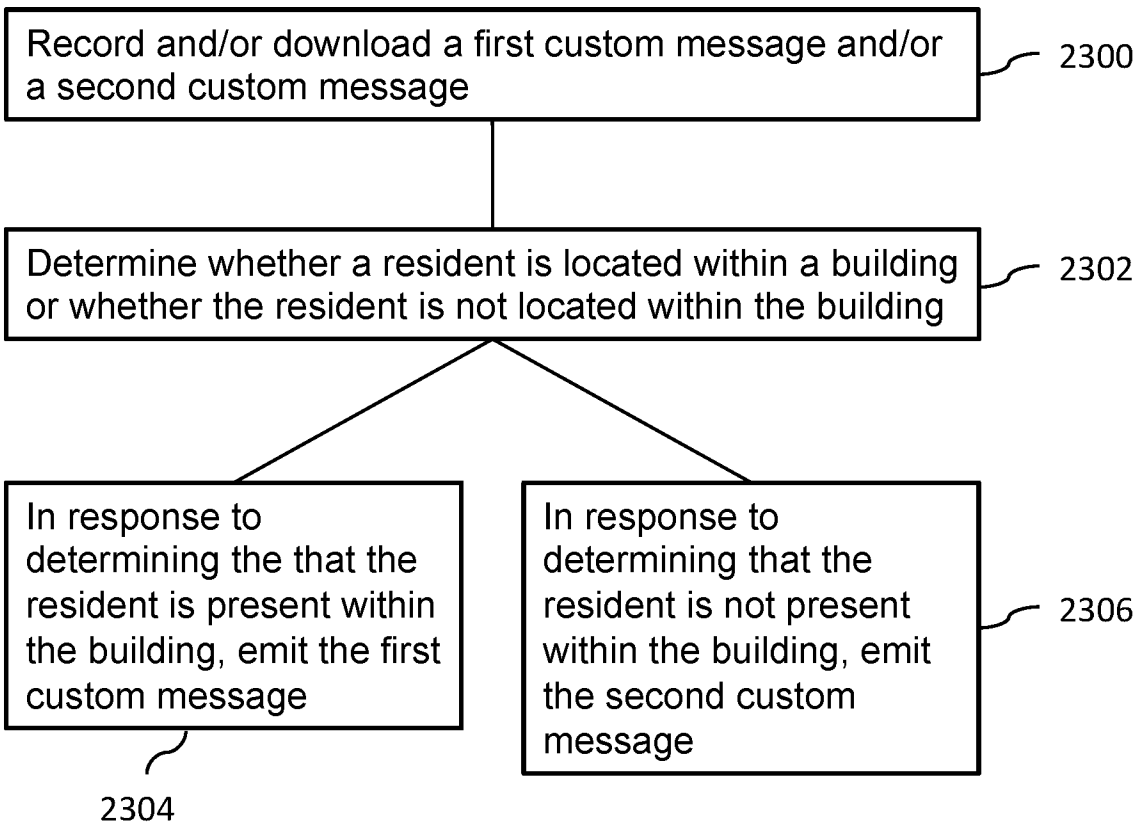
Record and/or download a first custom message and/or a second custom message
2300
Determine whether a resident is located within a building or whether the resident is not located within the building
2302
In response to determining the that the resident is present within the building, emit the first custom message
2304
In response to determining that the resident is not present within the building, emit the second custom message
2306

**Figure 23**

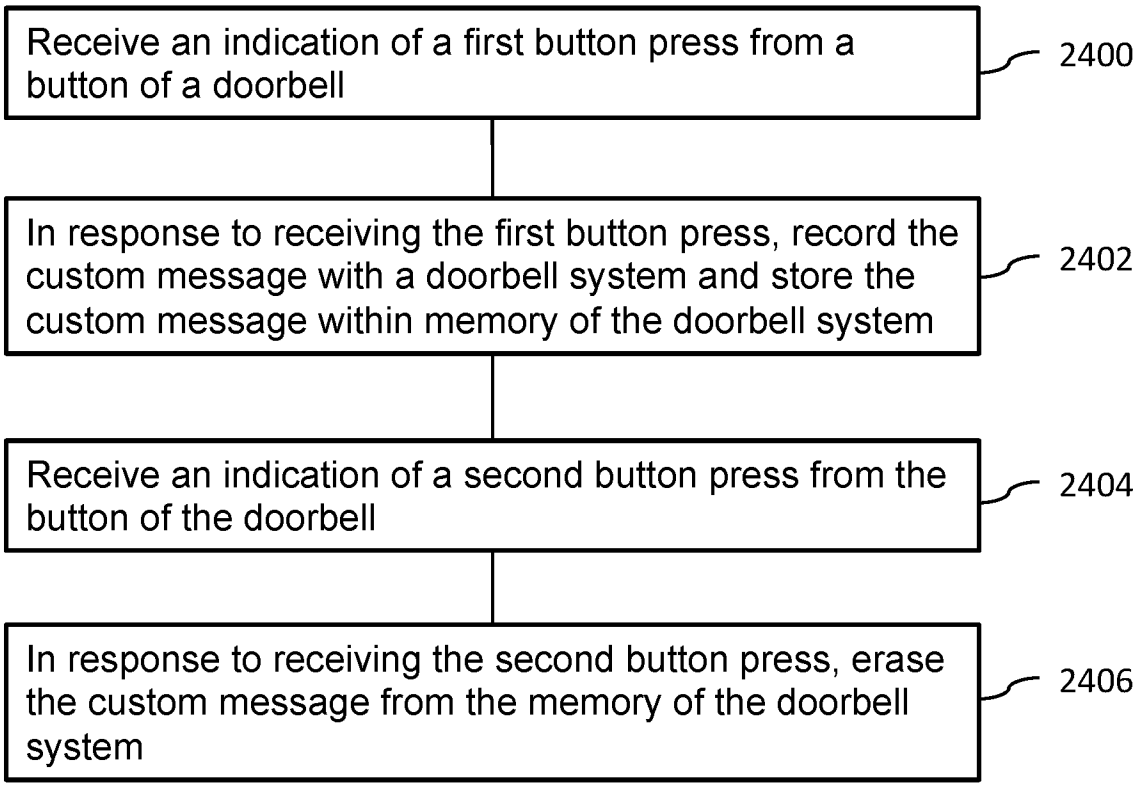


**Figure 24**

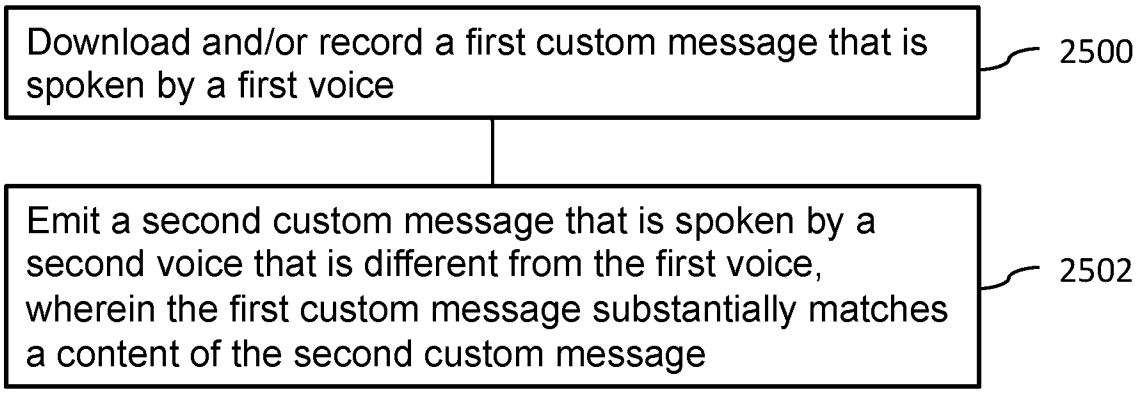


**Figure 25**

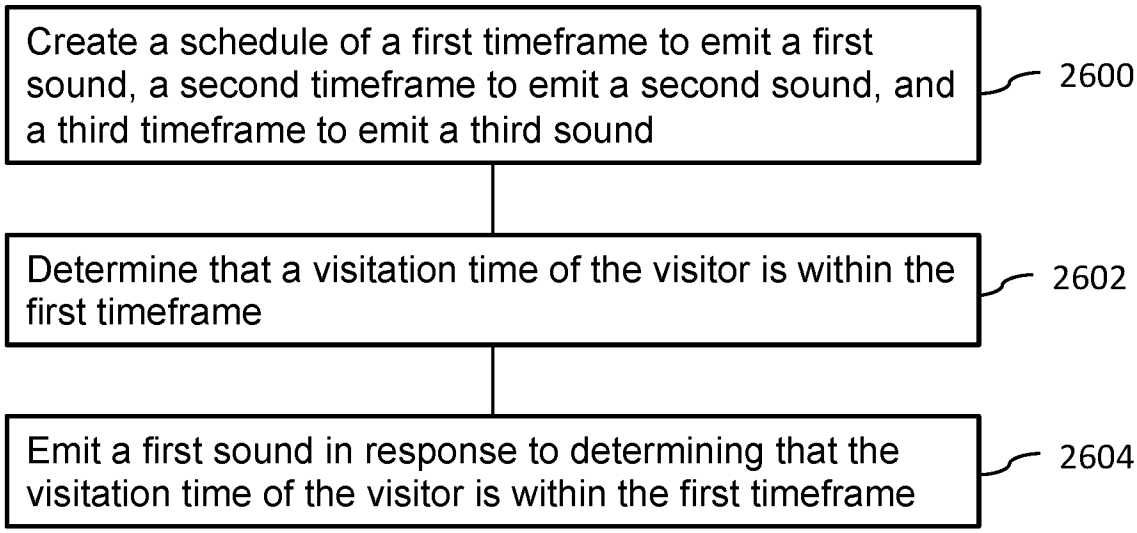


**Figure 26**

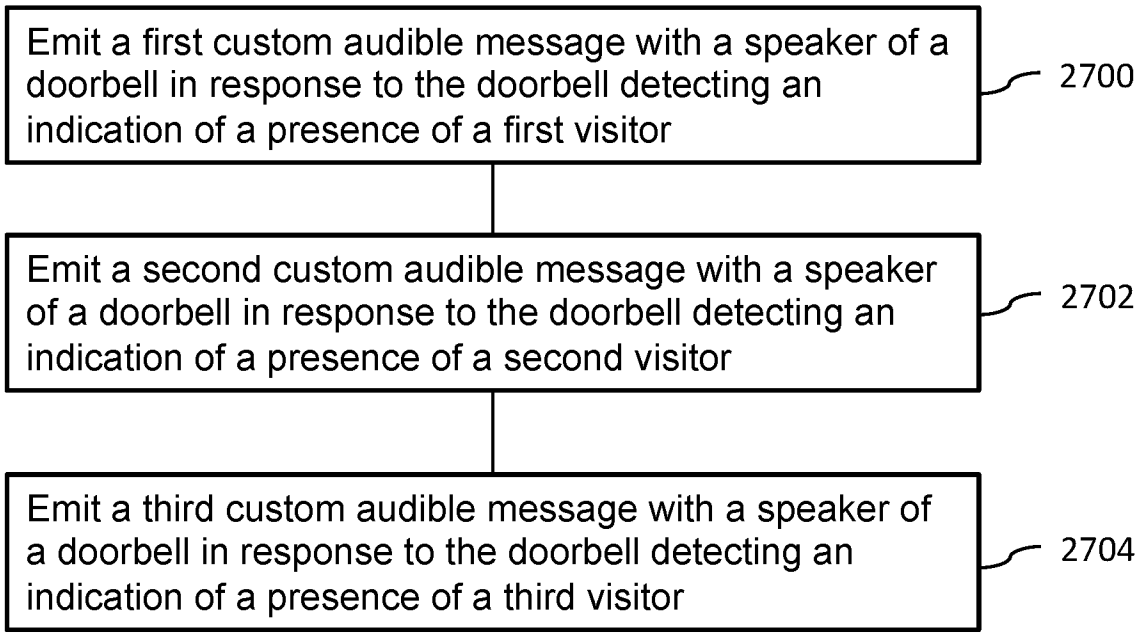


**Figure 27**

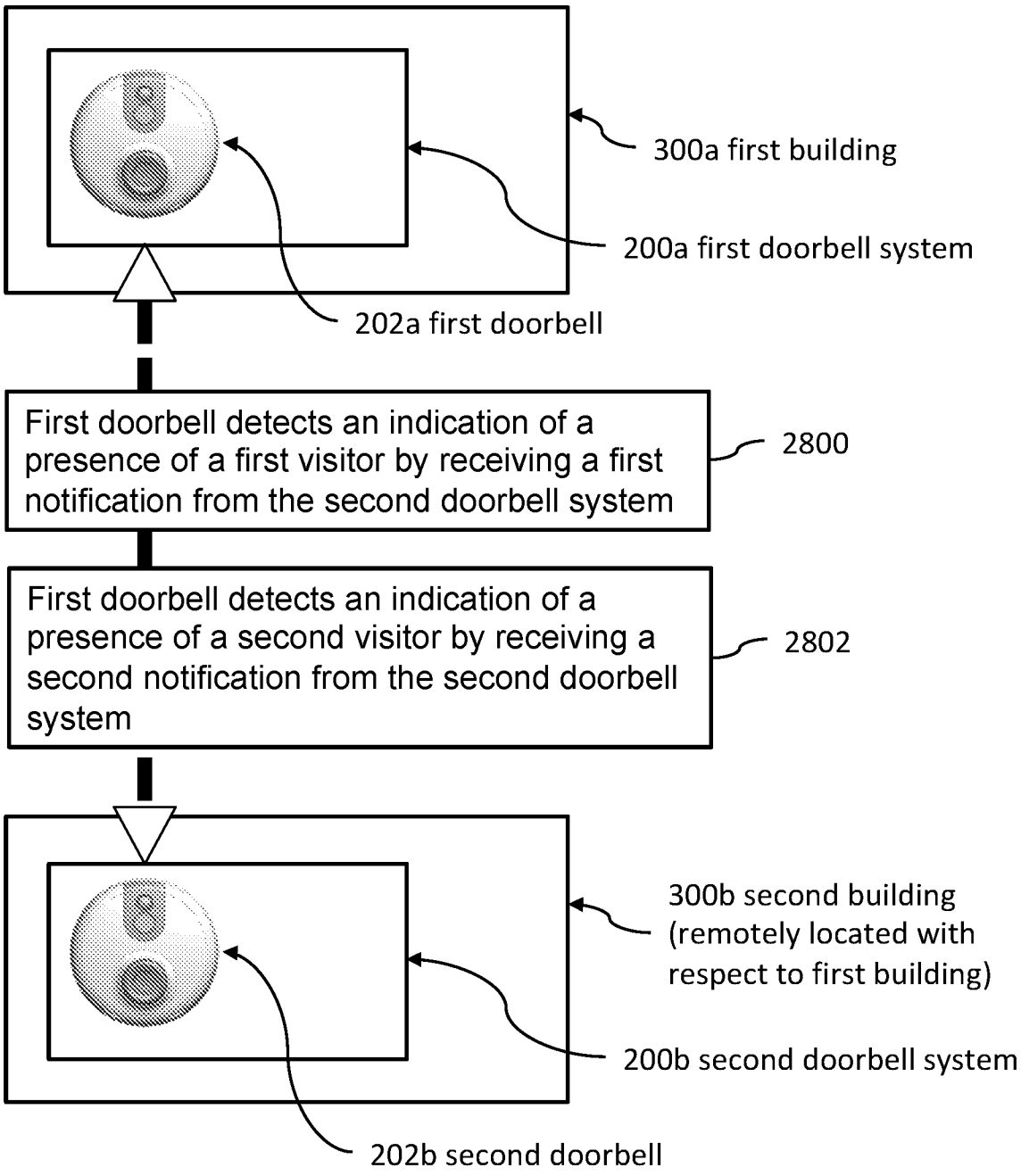
300a first building
200a first doorbell system
202a first doorbell
First doorbell detects an indication of a presence of a first visitor by receiving a first notification from the second doorbell system
2800
First doorbell detects an indication of a presence of a second visitor by receiving a second notification from the second doorbell system
2802
300b second building (remotely located with respect to first building)
200b second doorbell system
202b second doorbell

**Figure 28**

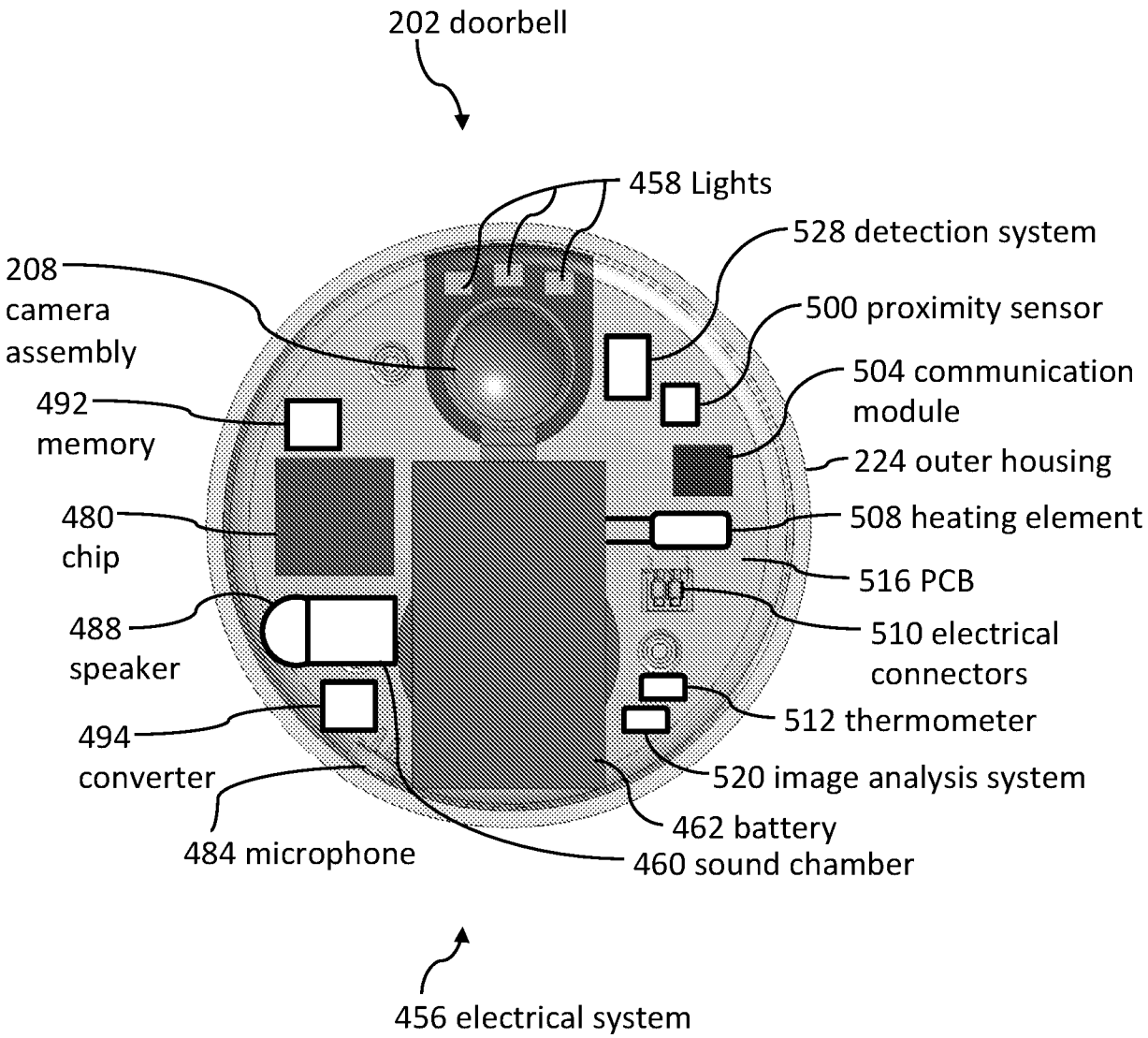
202 doorbell
458 Lights
528 detection system
208
camera
assembly
500 proximity sensor
504 communication
module
492
memory
224 outer housing
480
chip
508 heating element
516 PCB
488
speaker
510 electrical
connectors
494
converter
512 thermometer
520 image analysis system
462 battery
484 microphone
460 sound chamber
456 electrical system

**Figure 29**

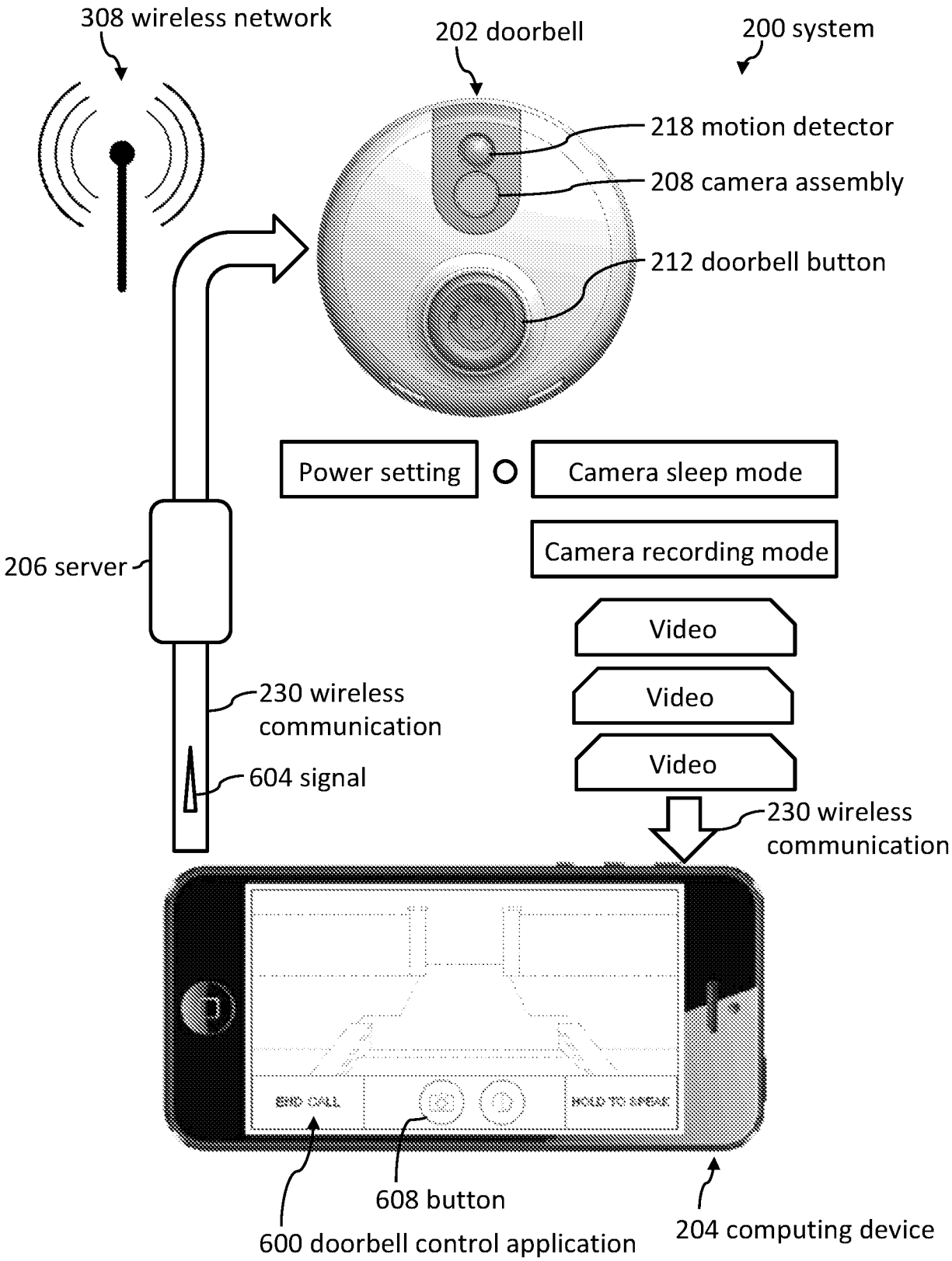
308 wireless network
202 doorbell
200 system
218 motion detector
208 camera assembly
212 doorbell button
Power setting
Camera sleep mode
Camera recording mode
206 server
Video
Video
Video
230 wireless communication
604 signal
230 wireless communication
608 button
600 doorbell control application
204 computing device

**Figure 30**

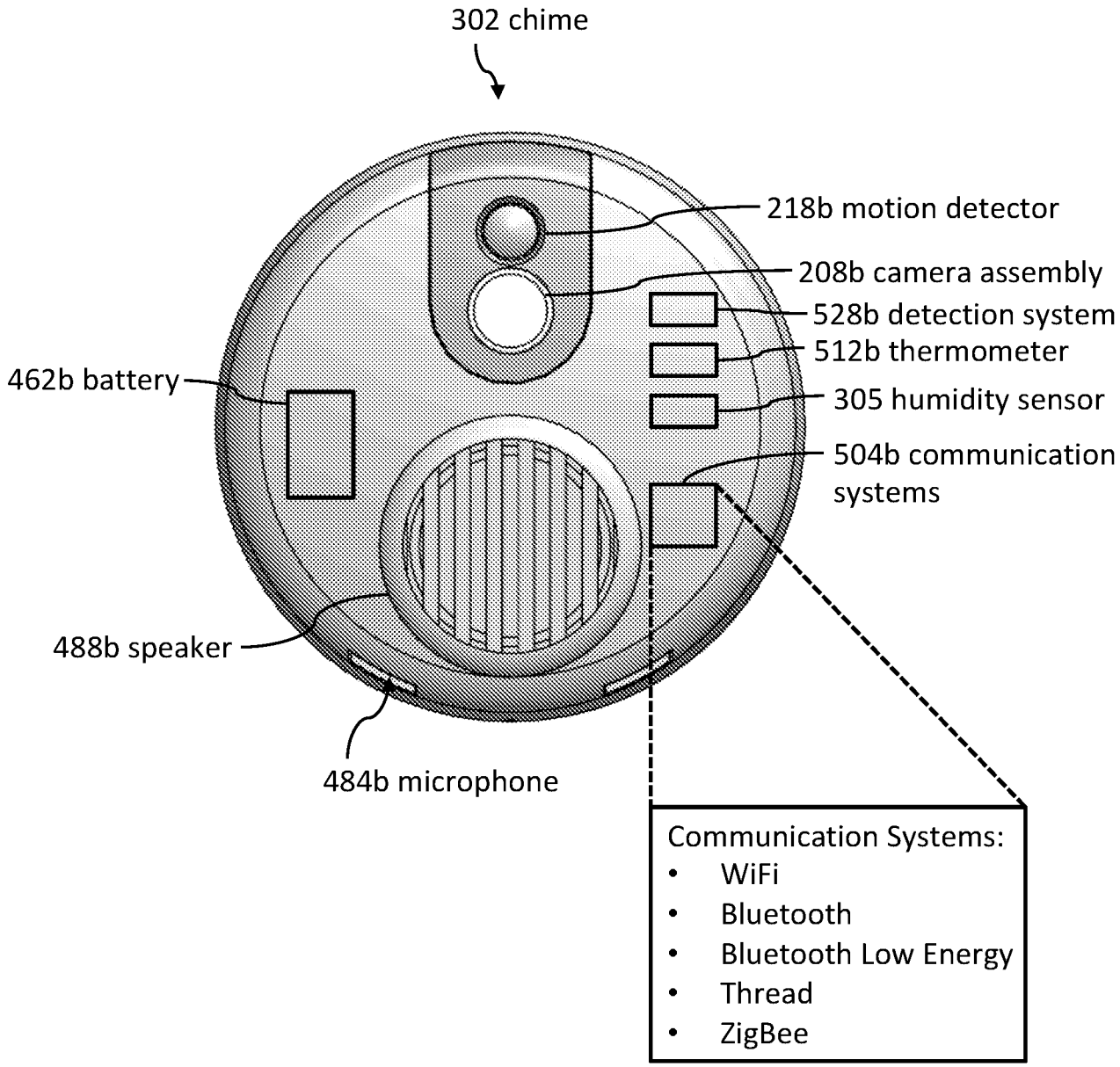
302 chime
218b motion detector
208b camera assembly
528b detection system
512b thermometer
305 humidity sensor
504b communication systems
462b battery
488b speaker
484b microphone
Communication Systems:
• WiFi
• Bluetooth
• Bluetooth Low Energy
• Thread
• ZigBee

**Figure 31**

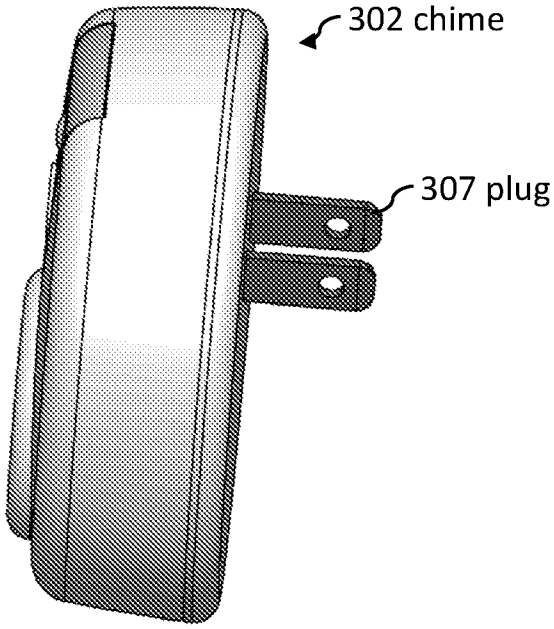


Figure 32

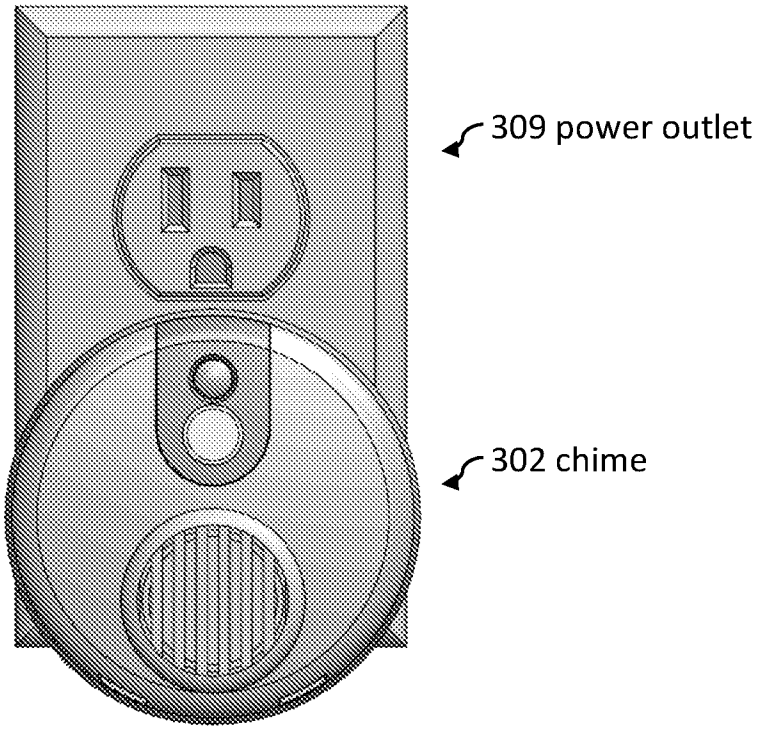


Figure 33

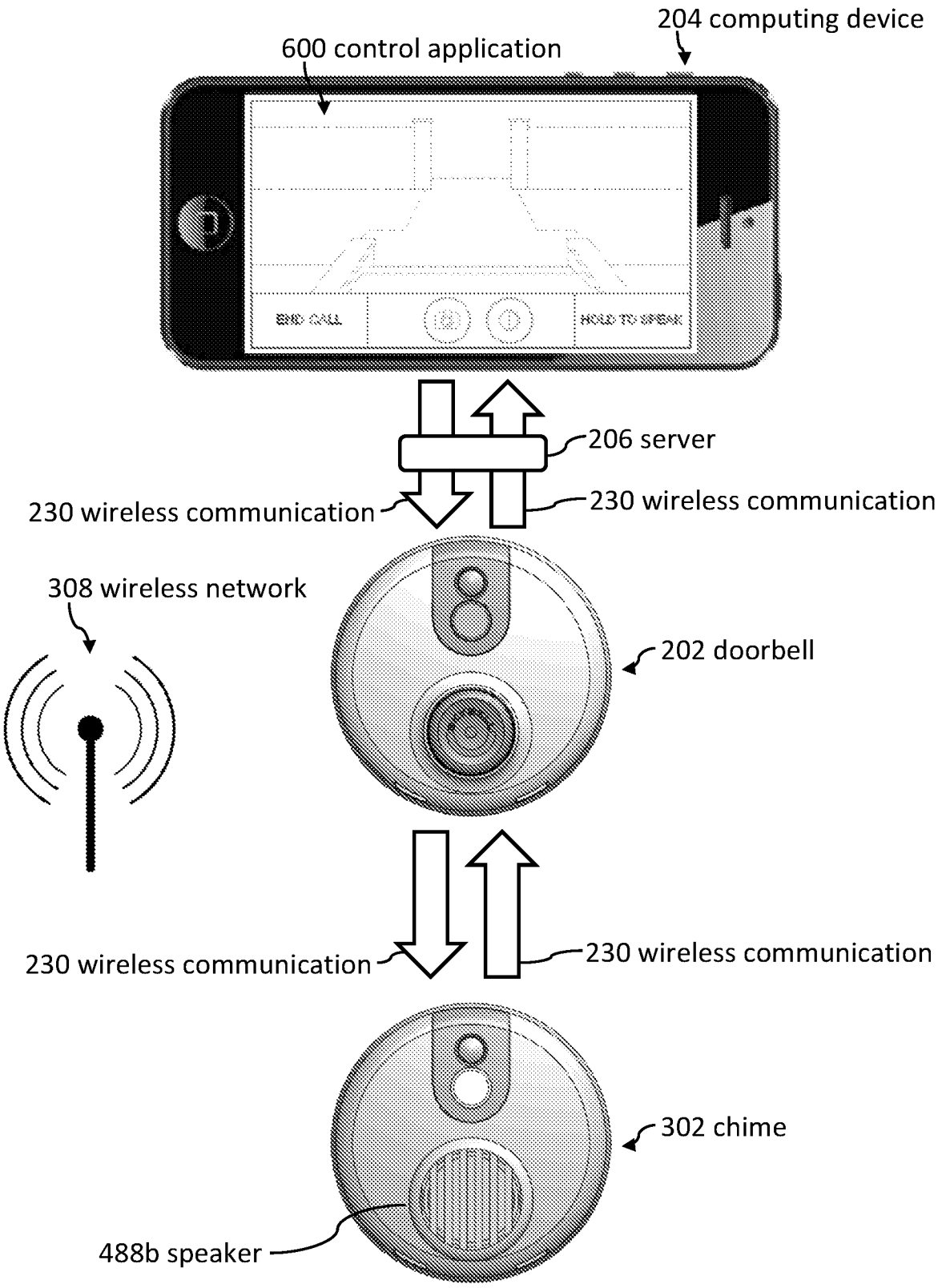
204 computing device
600 control application
206 server
230 wireless communication
230 wireless communication
308 wireless network
202 doorbell
230 wireless communication
230 wireless communication
302 chime
488b speaker

**Figure 34**

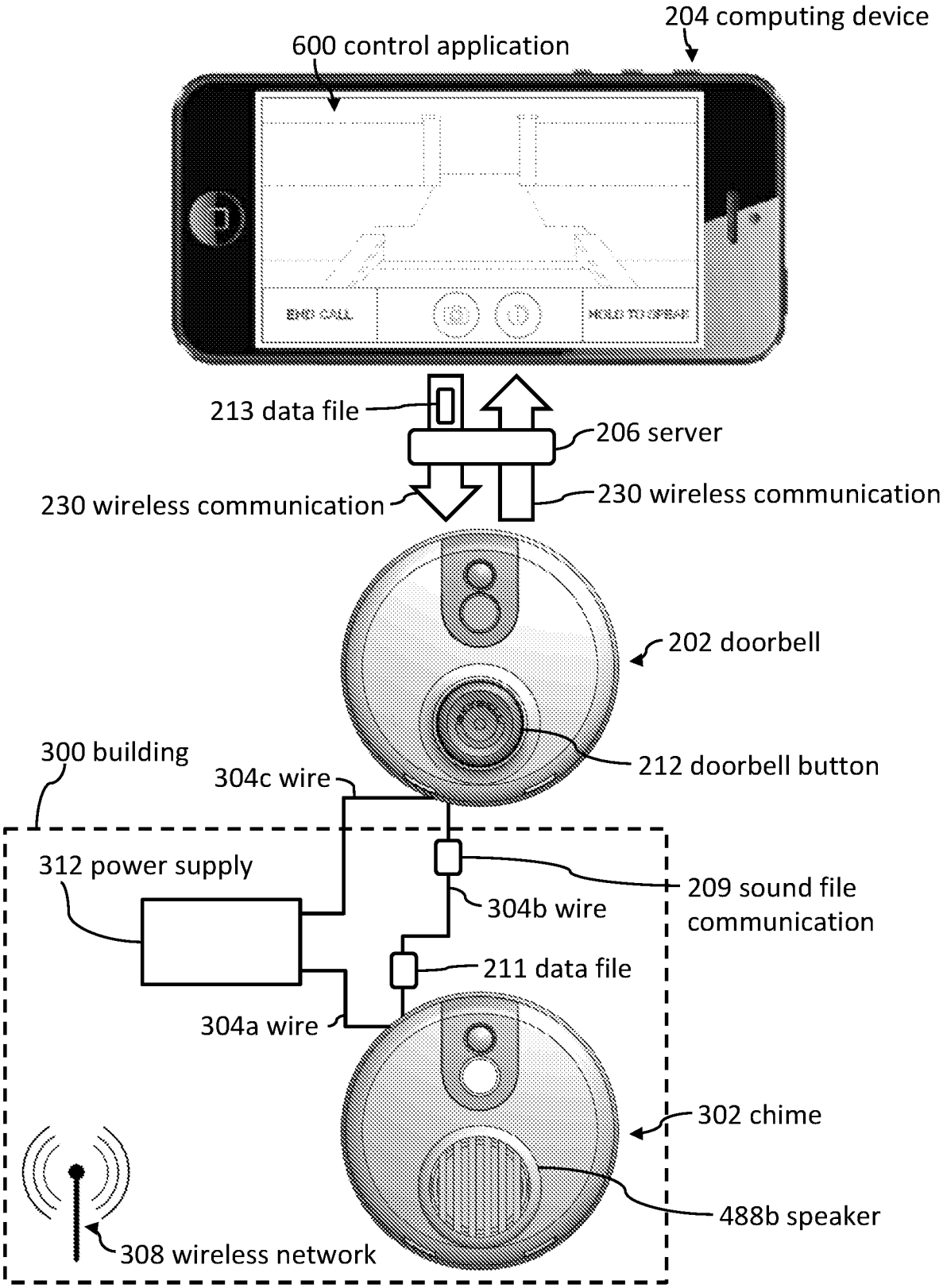
204 computing device
600 control application
213 data file
206 server
230 wireless communication
230 wireless communication
202 doorbell
212 doorbell button
300 building
304c wire
312 power supply
209 sound file communication
304b wire
211 data file
304a wire
302 chime
488b speaker
308 wireless network

**Figure 35**

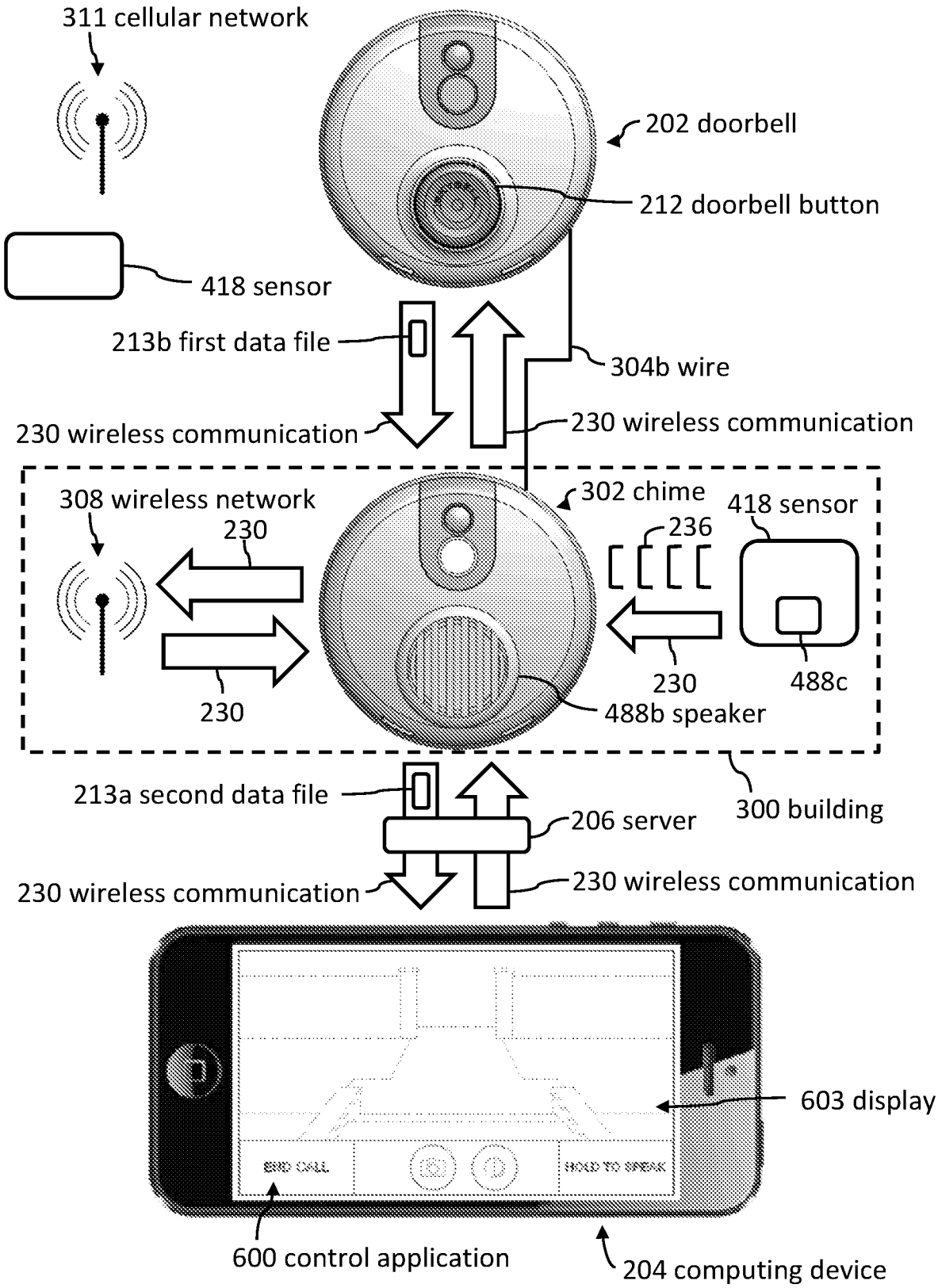
311 cellular network
202 doorbell
212 doorbell button
418 sensor
213b first data file
304b wire
230 wireless communication
230 wireless communication
308 wireless network
230
302 chime
418 sensor
236
230
230
488c
488b speaker
300 building
213a second data file
206 server
230 wireless communication
230 wireless communication
603 display
END CALL
HOLD TO SPEAK
600 control application
204 computing device

**Figure 36**

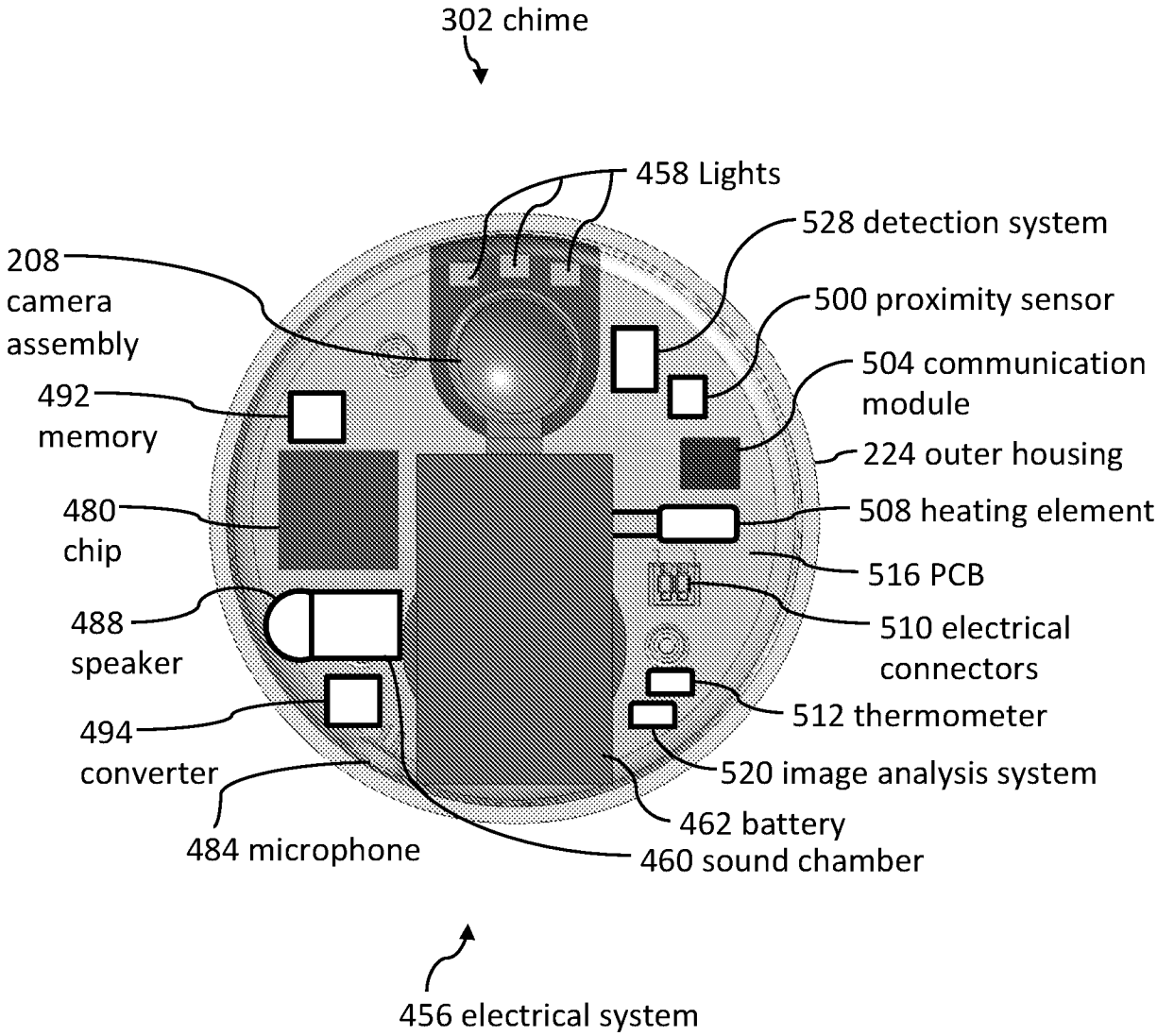
302 chime
458 Lights
528 detection system
208
camera
assembly
500 proximity sensor
504 communication
module
492
memory
224 outer housing
480
chip
508 heating element
516 PCB
488
speaker
510 electrical
connectors
494
converter
512 thermometer
520 image analysis system
462 battery
484 microphone
460 sound chamber
456 electrical system

**Figure 37**

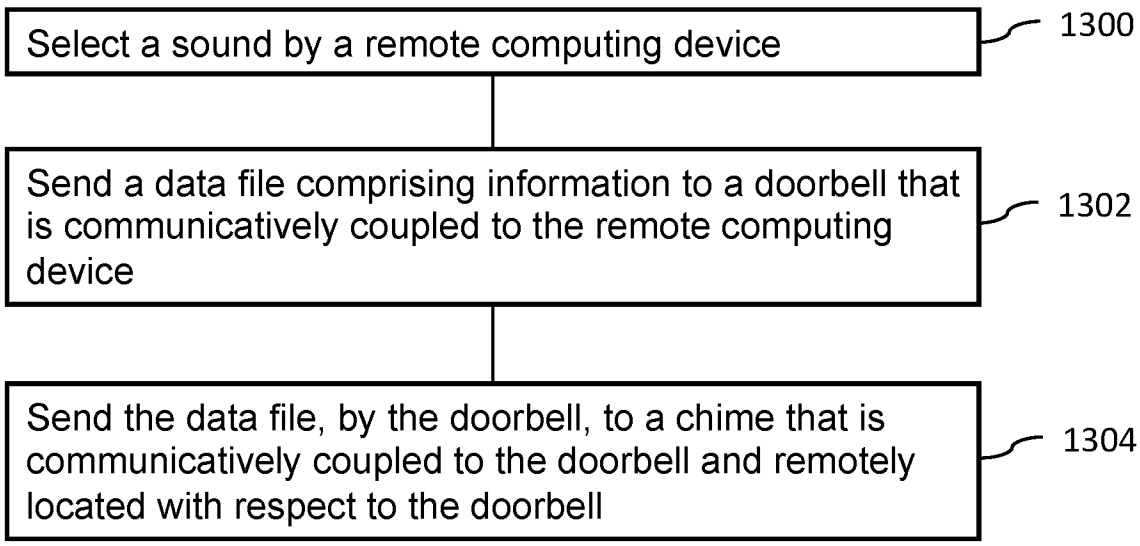


**Figure 38**

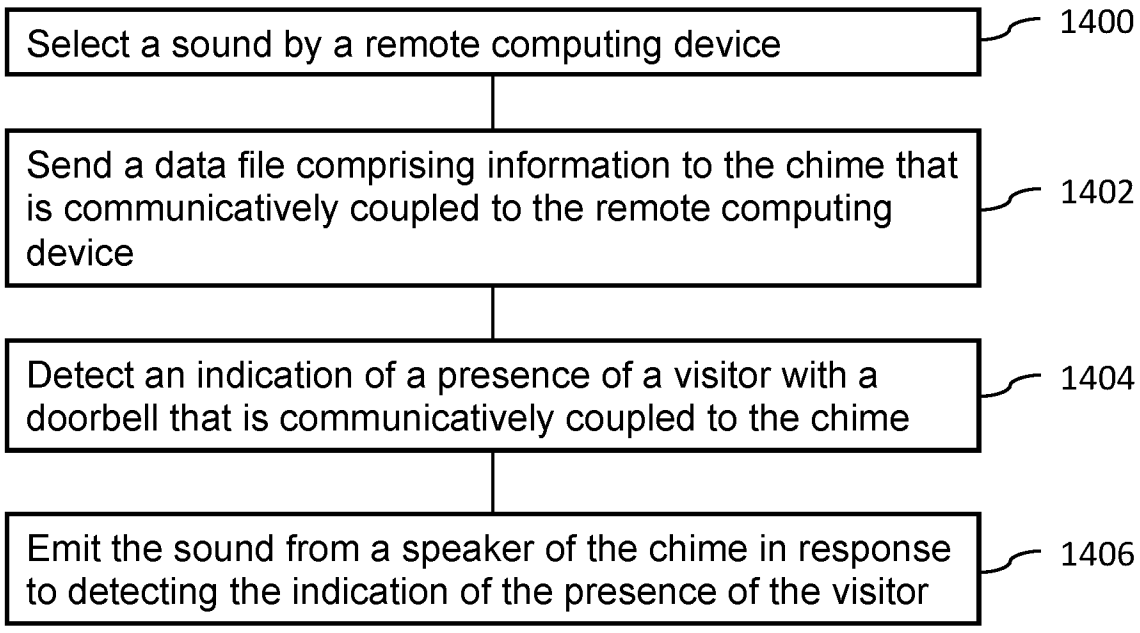


**Figure 39**

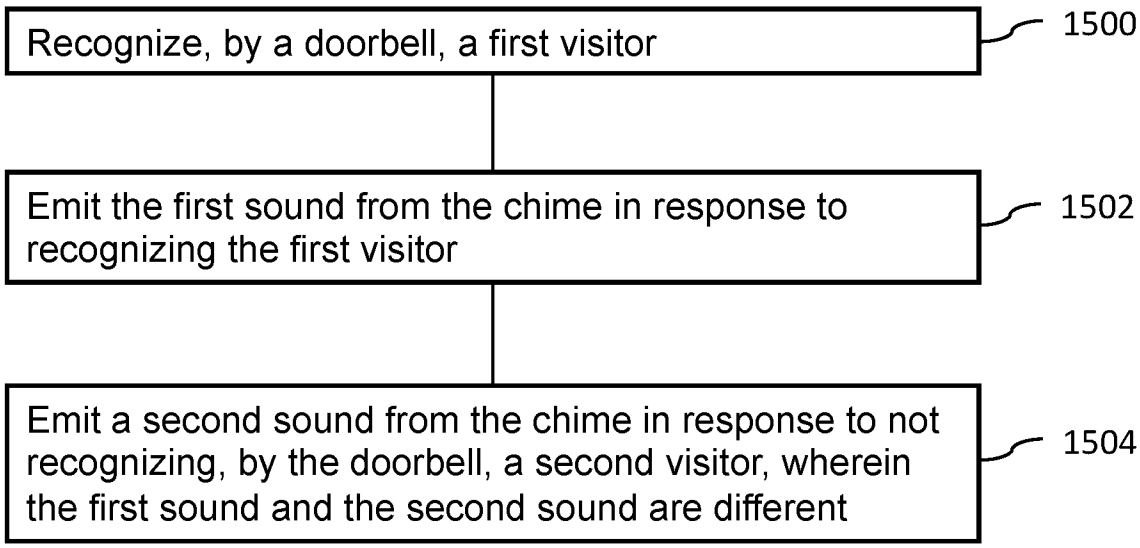


**Figure 40**

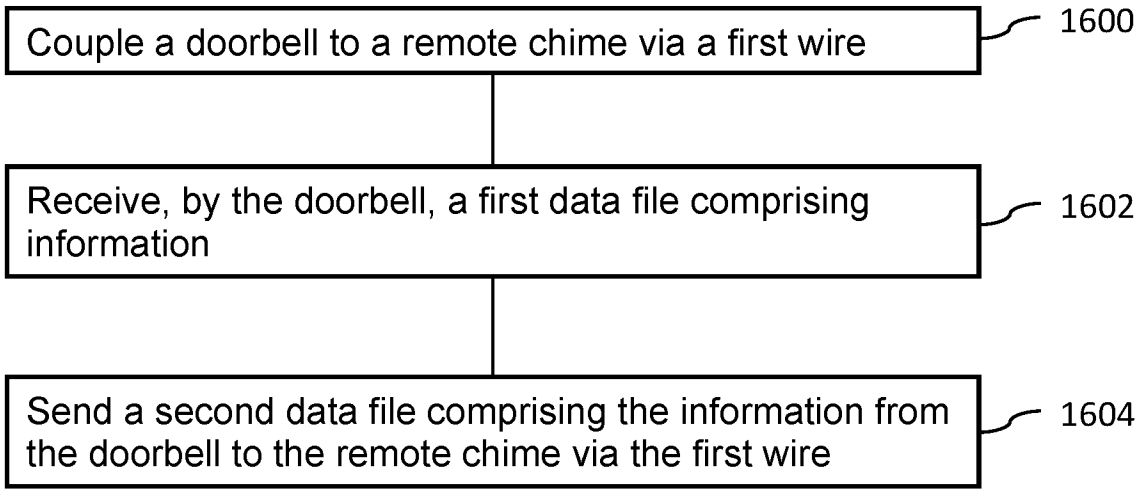


**Figure 41**

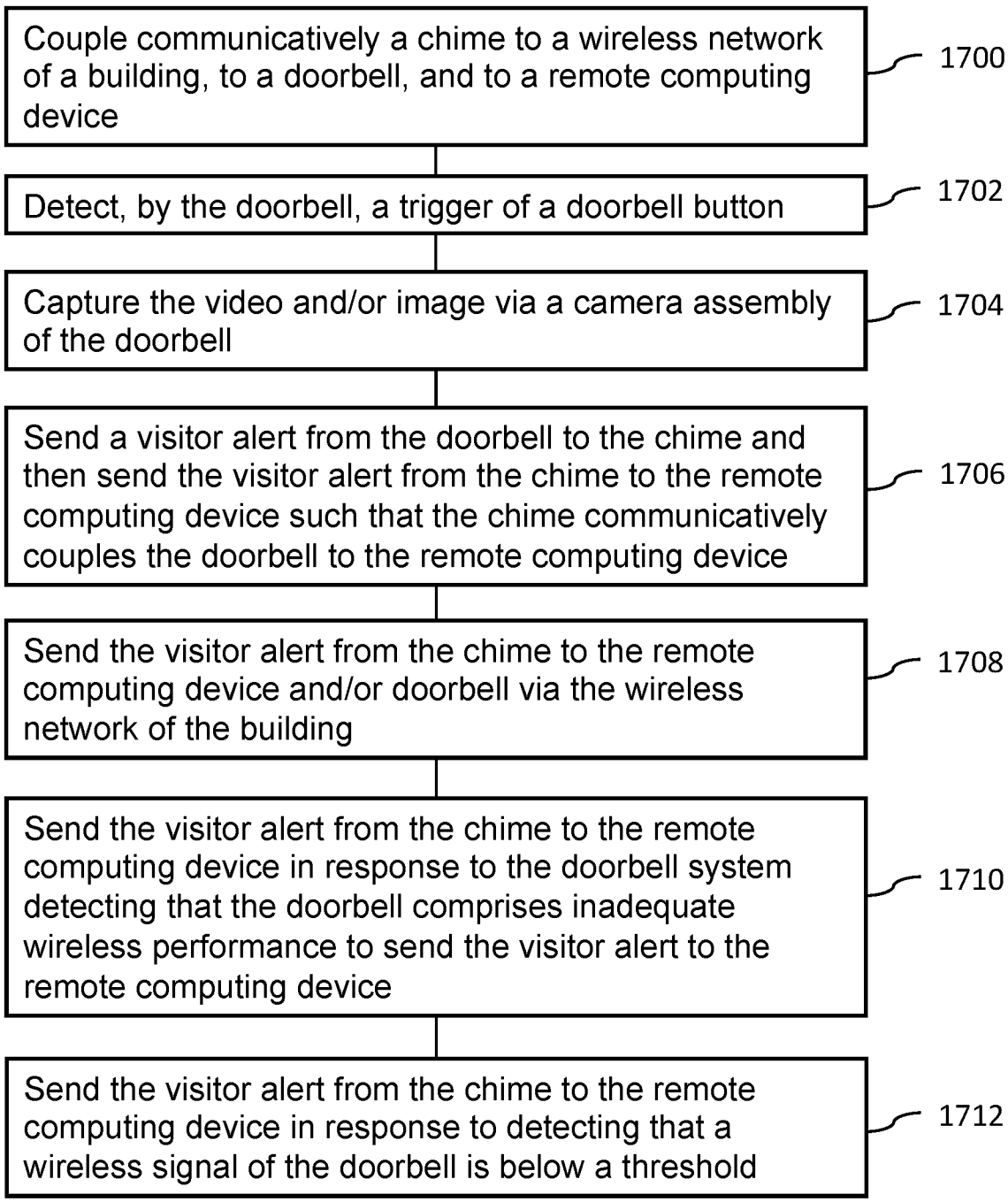
Couple communicatively a chime to a wireless network of a building, to a doorbell, and to a remote computing device
1700
Detect, by the doorbell, a trigger of a doorbell button
1702
Capture the video and/or image via a camera assembly of the doorbell
1704
Send a visitor alert from the doorbell to the chime and then send the visitor alert from the chime to the remote computing device such that the chime communicatively couples the doorbell to the remote computing device
1706
Send the visitor alert from the chime to the remote computing device and/or doorbell via the wireless network of the building
1708
Send the visitor alert from the chime to the remote computing device in response to the doorbell system detecting that the doorbell comprises inadequate wireless performance to send the visitor alert to the remote computing device
1710
Send the visitor alert from the chime to the remote computing device in response to detecting that a wireless signal of the doorbell is below a threshold
1712

**Figure 42**

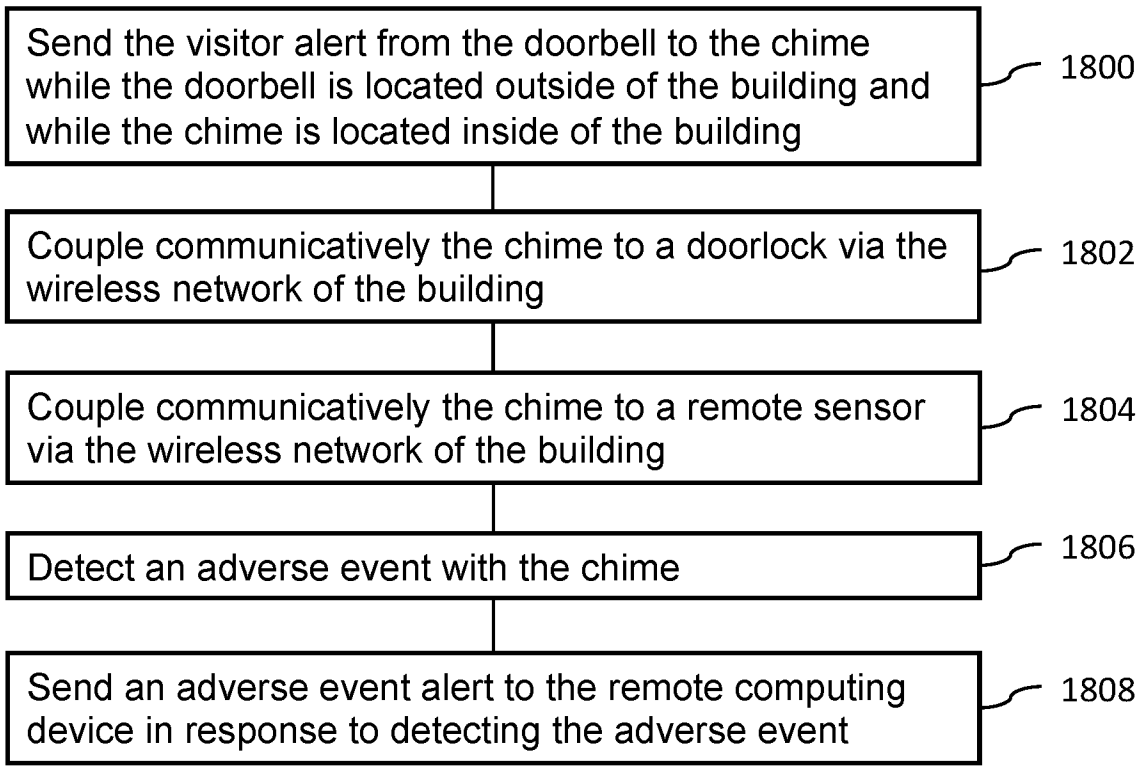
Send the visitor alert from the doorbell to the chime while the doorbell is located outside of the building and while the chime is located inside of the building
1800
Couple communicatively the chime to a doorlock via the wireless network of the building
1802
Couple communicatively the chime to a remote sensor via the wireless network of the building
1804
Detect an adverse event with the chime
1806
Send an adverse event alert to the remote computing device in response to detecting the adverse event
1808

**Figure 43**

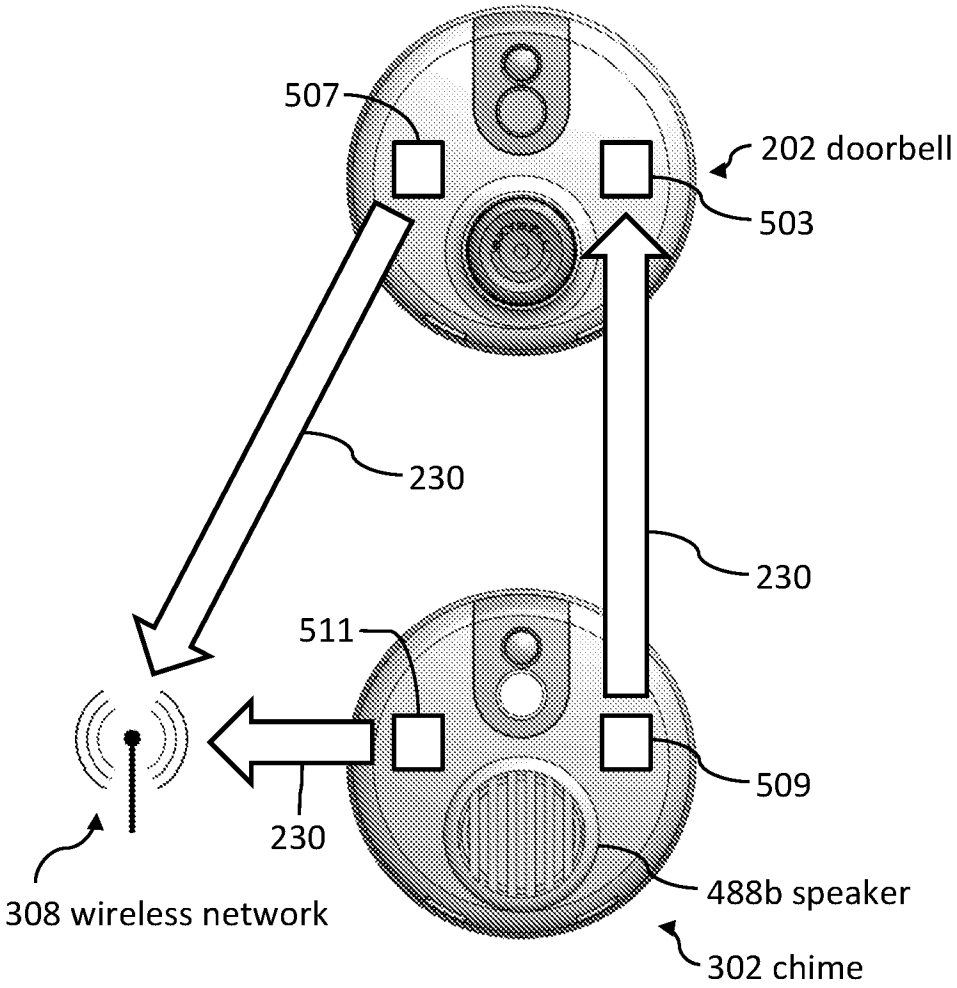
507
202 doorbell
503
230
230
511
509
230
488b speaker
308 wireless network
302 chime

**Figure 44**

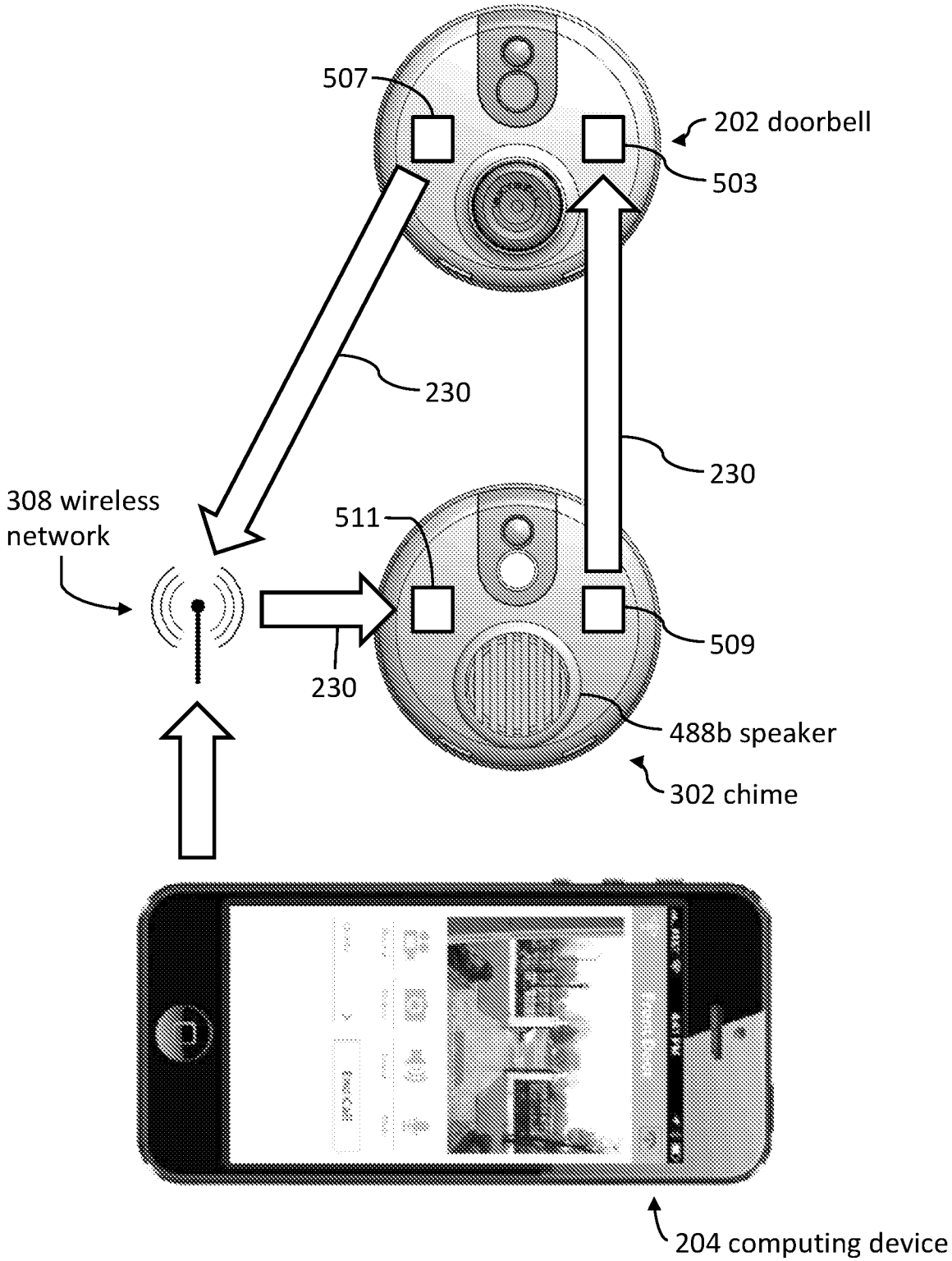
507
202 doorbell
503
230
230
308 wireless network
511
509
230
488b speaker
302 chime
204 computing device

**Figure 45**

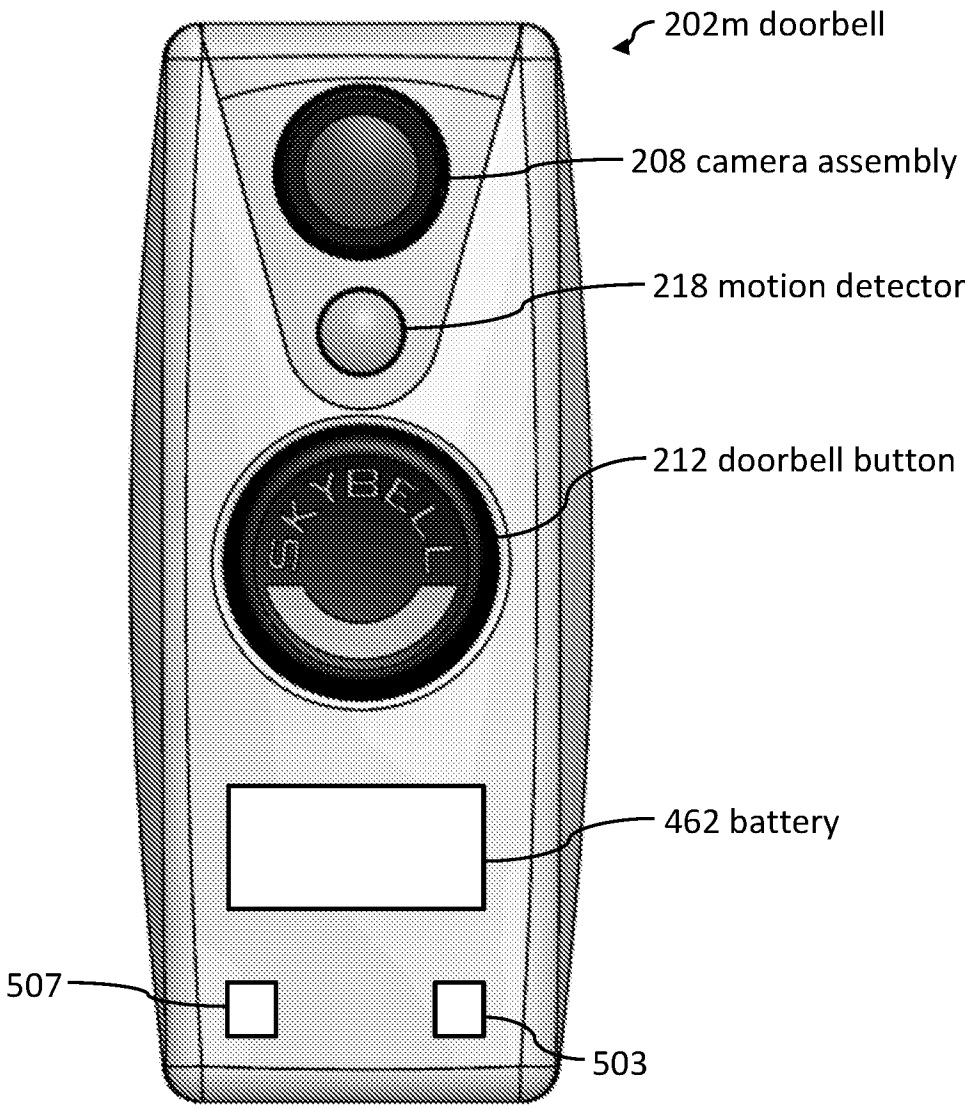
202m doorbell
208 camera assembly
218 motion detector
212 doorbell button
462 battery
507
503

**Figure 46**

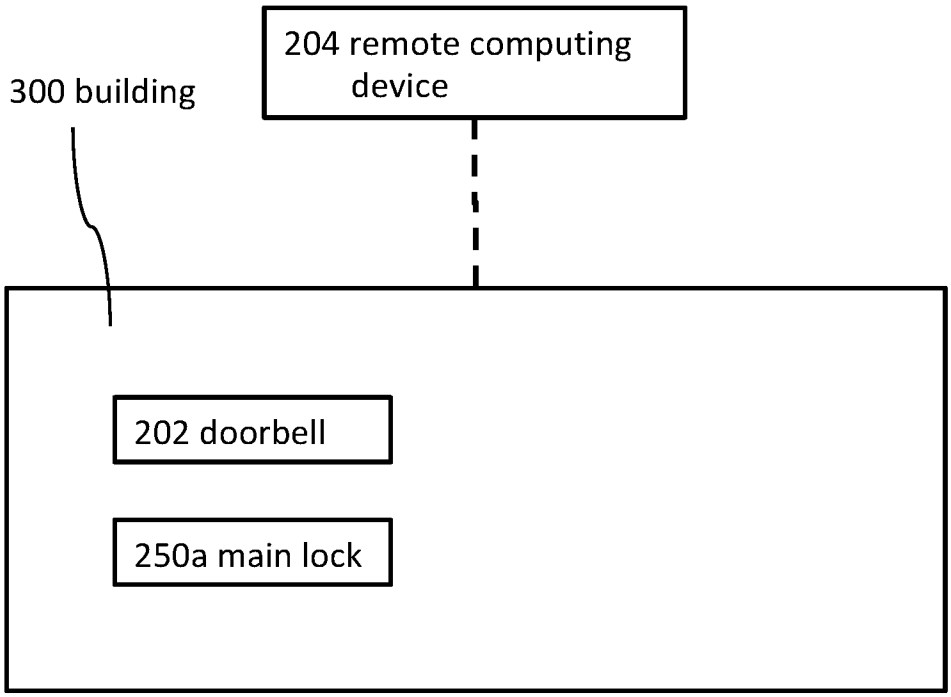
204 remote computing device
300 building
202 doorbell
250a main lock

**Figure 47**

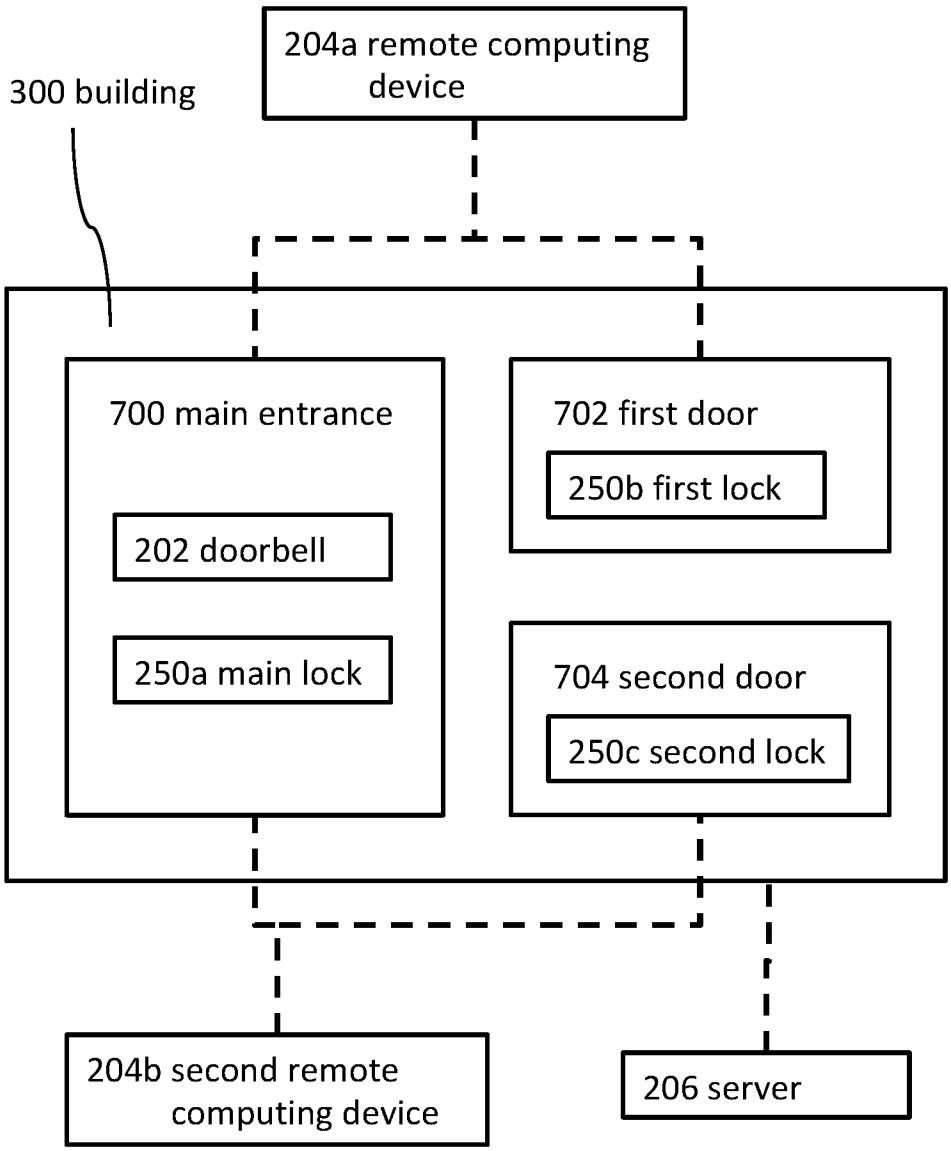
204a remote computing device
300 building
700 main entrance
202 doorbell
250a main lock
702 first door
250b first lock
704 second door
250c second lock
204b second remote computing device
206 server

**Figure 48**

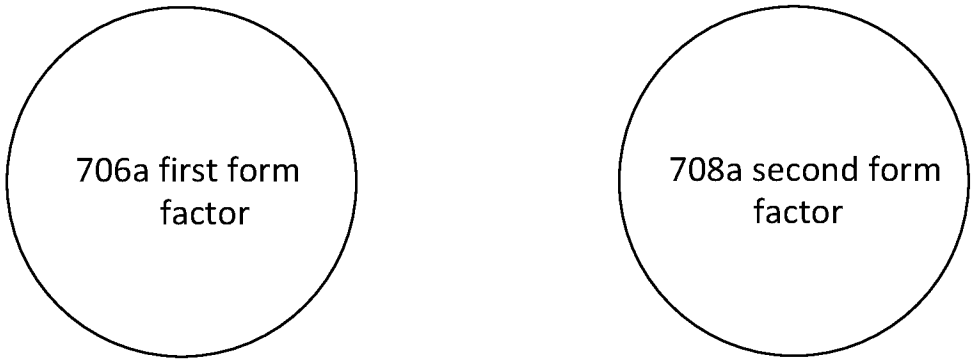


**Figure 49**

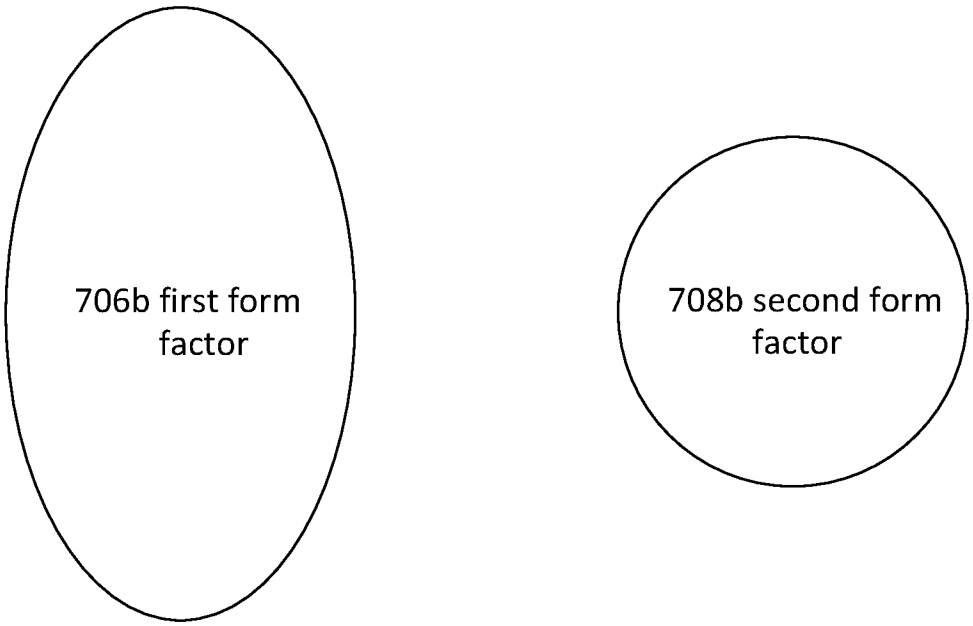


**Figure 50**

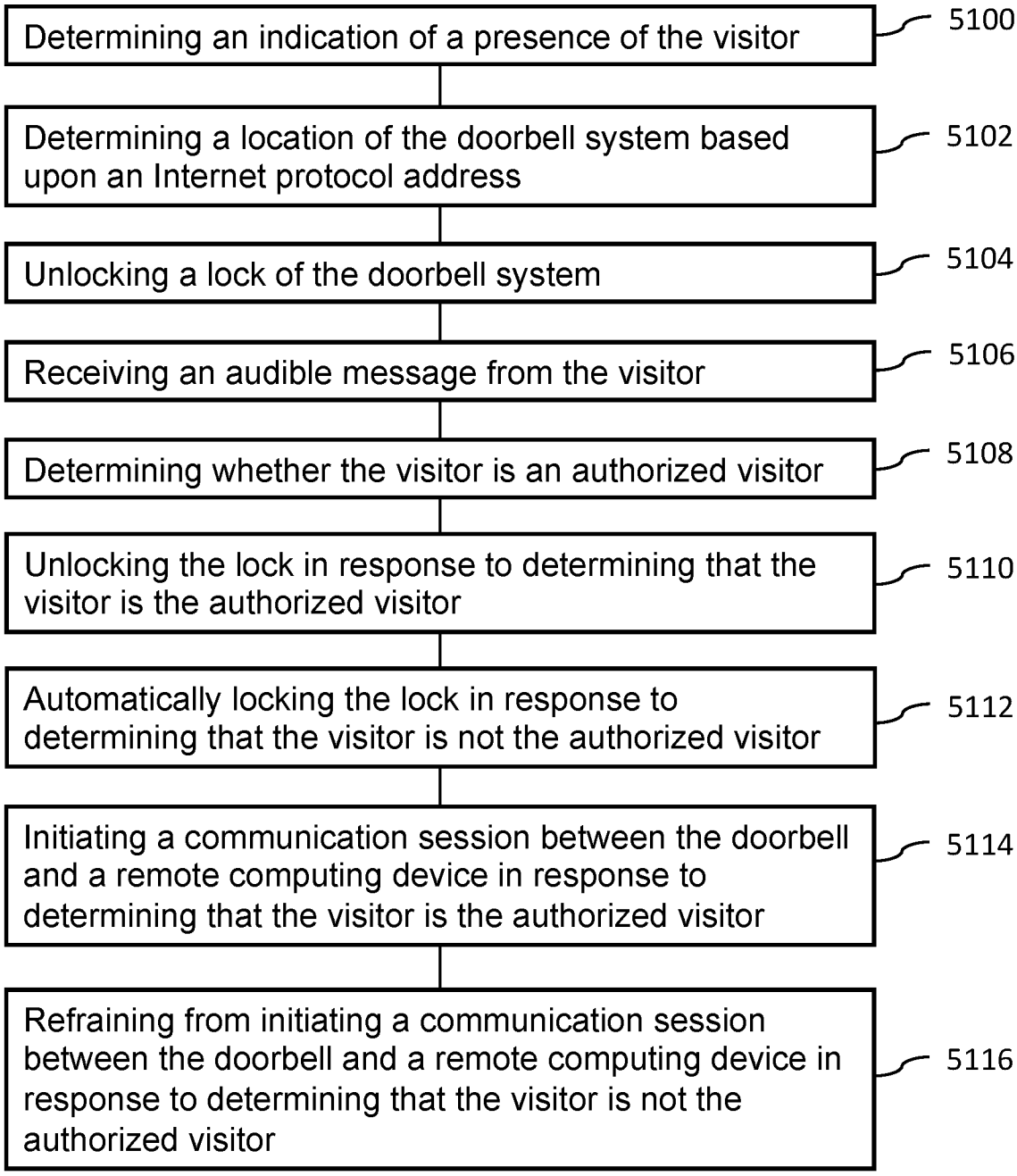
Determining an indication of a presence of the visitor
5100
Determining a location of the doorbell system based upon an Internet protocol address
5102
Unlocking a lock of the doorbell system
5104
Receiving an audible message from the visitor
5106
Determining whether the visitor is an authorized visitor
5108
Unlocking the lock in response to determining that the visitor is the authorized visitor
5110
Automatically locking the lock in response to determining that the visitor is not the authorized visitor
5112
Initiating a communication session between the doorbell and a remote computing device in response to determining that the visitor is the authorized visitor
5114
Refraining from initiating a communication session between the doorbell and a remote computing device in response to determining that the visitor is not the authorized visitor
5116

**Figure 51**

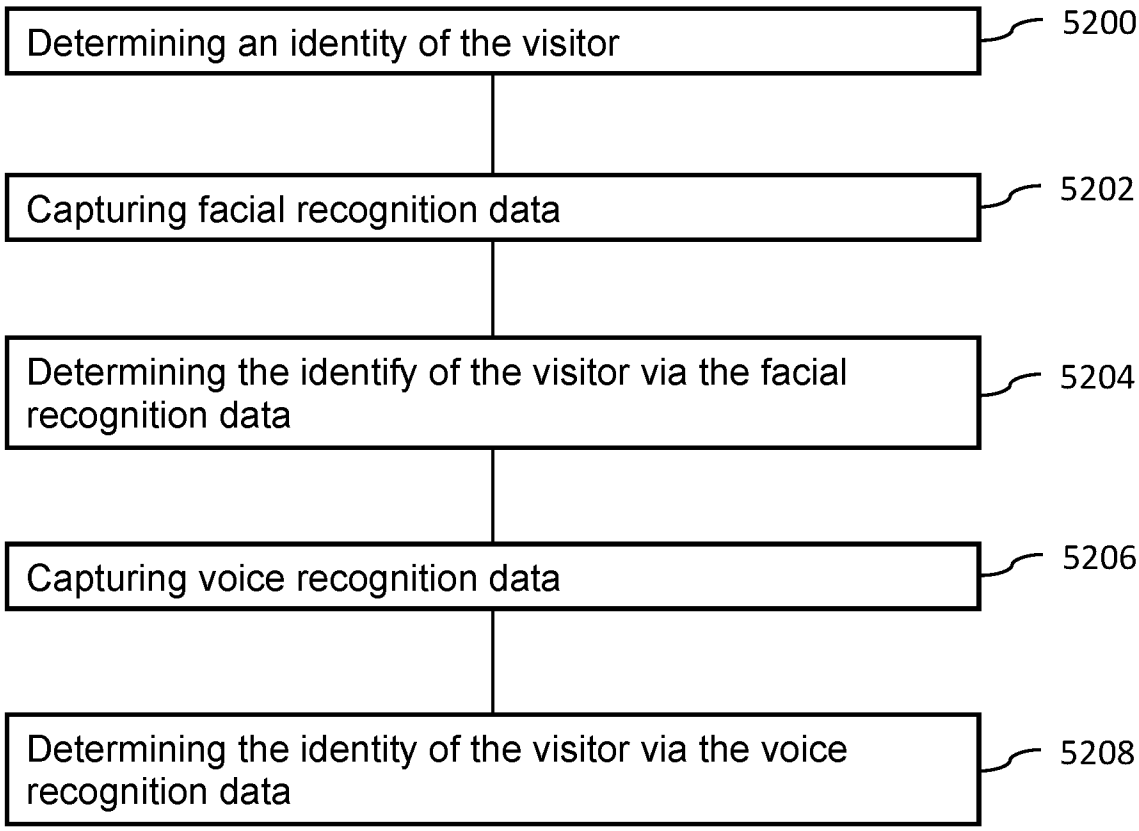
Determining an identity of the visitor
5200
Capturing facial recognition data
5202
Determining the identify of the visitor via the facial recognition data
5204
Capturing voice recognition data
5206
Determining the identity of the visitor via the voice recognition data
5208

**Figure 52**

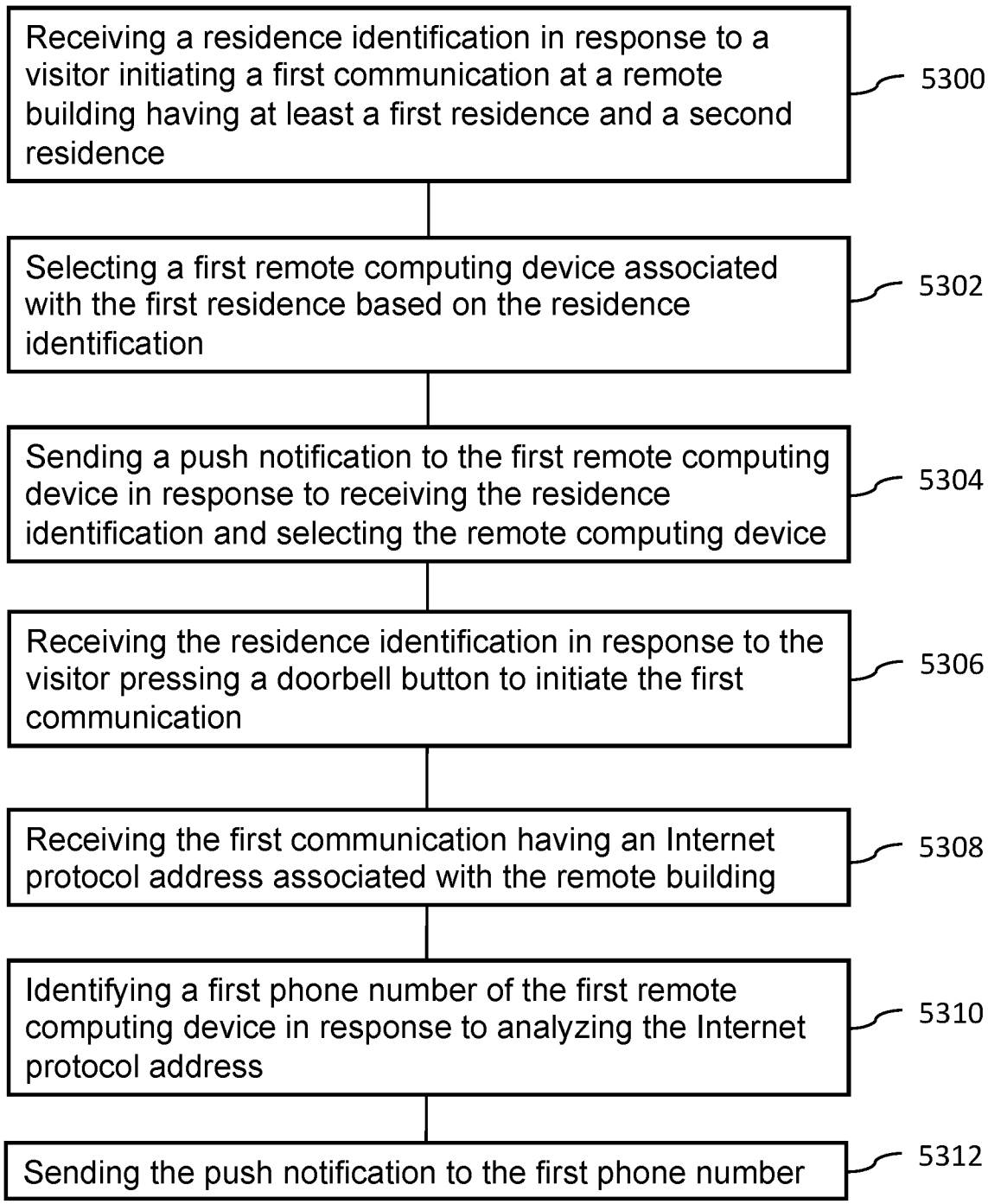
Receiving a residence identification in response to a visitor initiating a first communication at a remote building having at least a first residence and a second residence
5300
Selecting a first remote computing device associated with the first residence based on the residence identification
5302
Sending a push notification to the first remote computing device in response to receiving the residence identification and selecting the remote computing device
5304
Receiving the residence identification in response to the visitor pressing a doorbell button to initiate the first communication
5306
Receiving the first communication having an Internet protocol address associated with the remote building
5308
Identifying a first phone number of the first remote computing device in response to analyzing the Internet protocol address
5310
Sending the push notification to the first phone number
5312

**Figure 53**

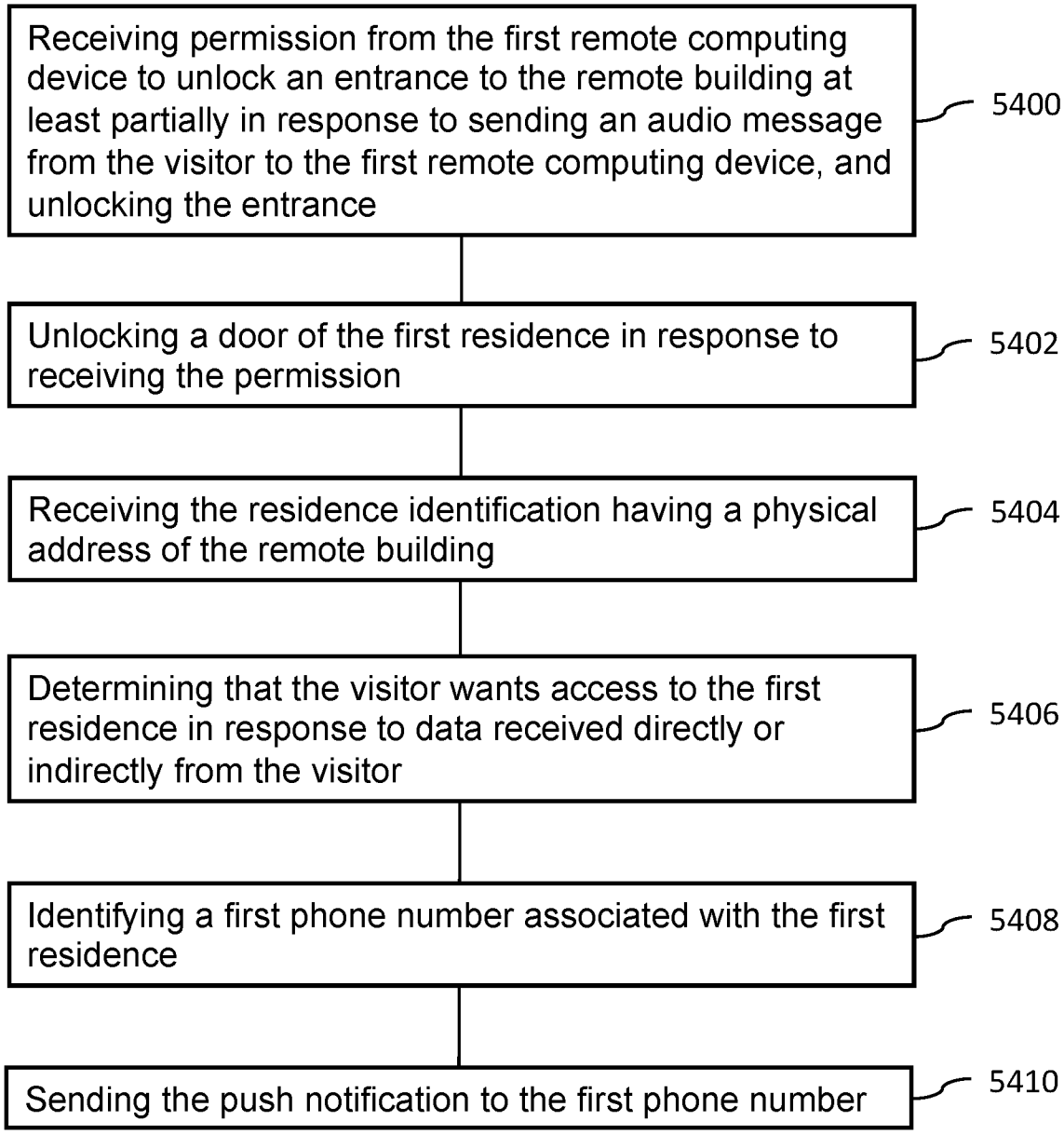
Receiving permission from the first remote computing device to unlock an entrance to the remote building at least partially in response to sending an audio message from the visitor to the first remote computing device, and unlocking the entrance
5400
Unlocking a door of the first residence in response to receiving the permission
5402
Receiving the residence identification having a physical address of the remote building
5404
Determining that the visitor wants access to the first residence in response to data received directly or indirectly from the visitor
5406
Identifying a first phone number associated with the first residence
5408
Sending the push notification to the first phone number
5410

**Figure 54**

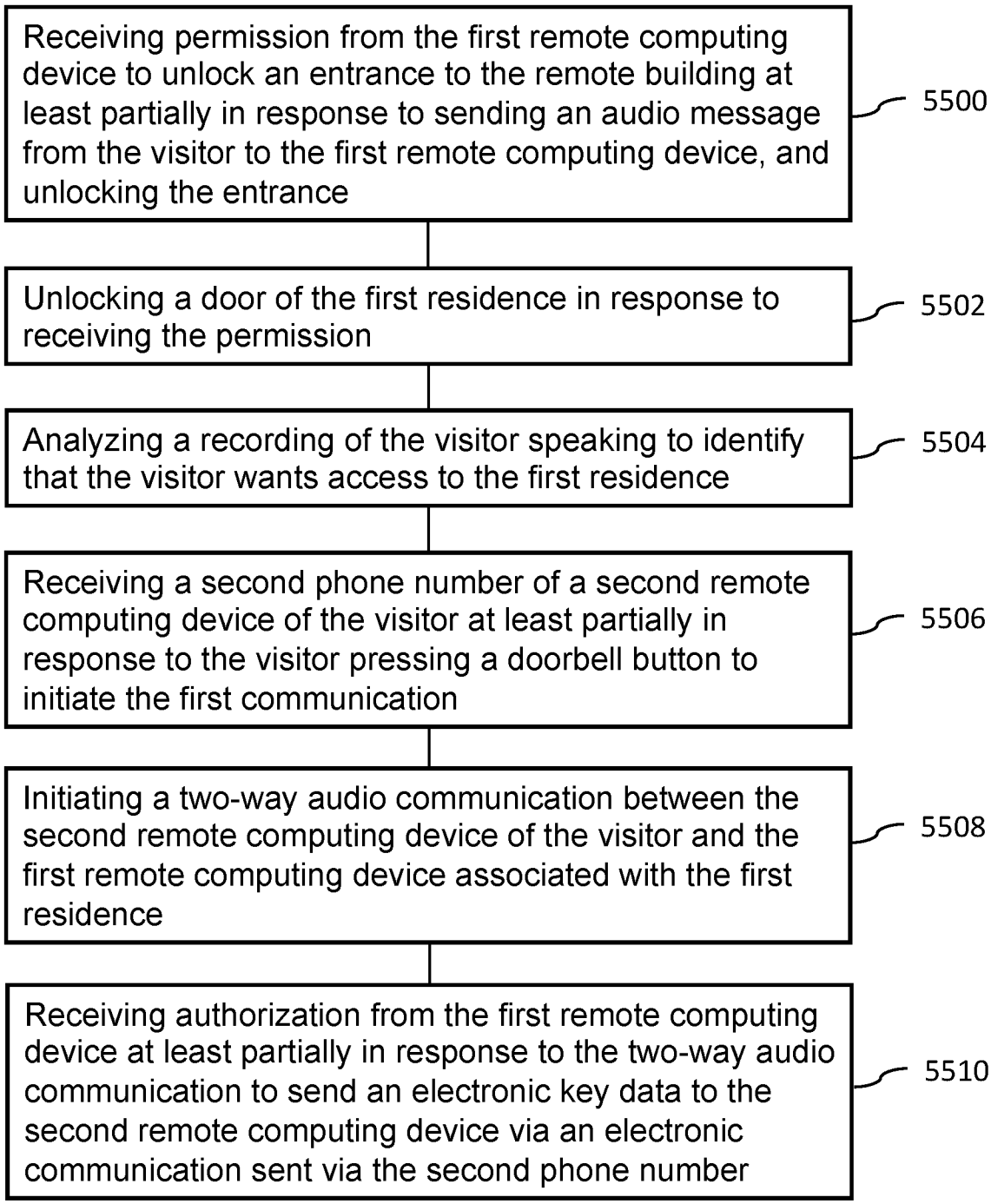
Receiving permission from the first remote computing device to unlock an entrance to the remote building at least partially in response to sending an audio message from the visitor to the first remote computing device, and unlocking the entrance
5500
Unlocking a door of the first residence in response to receiving the permission
5502
Analyzing a recording of the visitor speaking to identify that the visitor wants access to the first residence
5504
Receiving a second phone number of a second remote computing device of the visitor at least partially in response to the visitor pressing a doorbell button to initiate the first communication
5506
Initiating a two-way audio communication between the second remote computing device of the visitor and the first remote computing device associated with the first residence
5508
Receiving authorization from the first remote computing device at least partially in response to the two-way audio communication to send an electronic key data to the second remote computing device via an electronic communication sent via the second phone number
5510

**Figure 55**

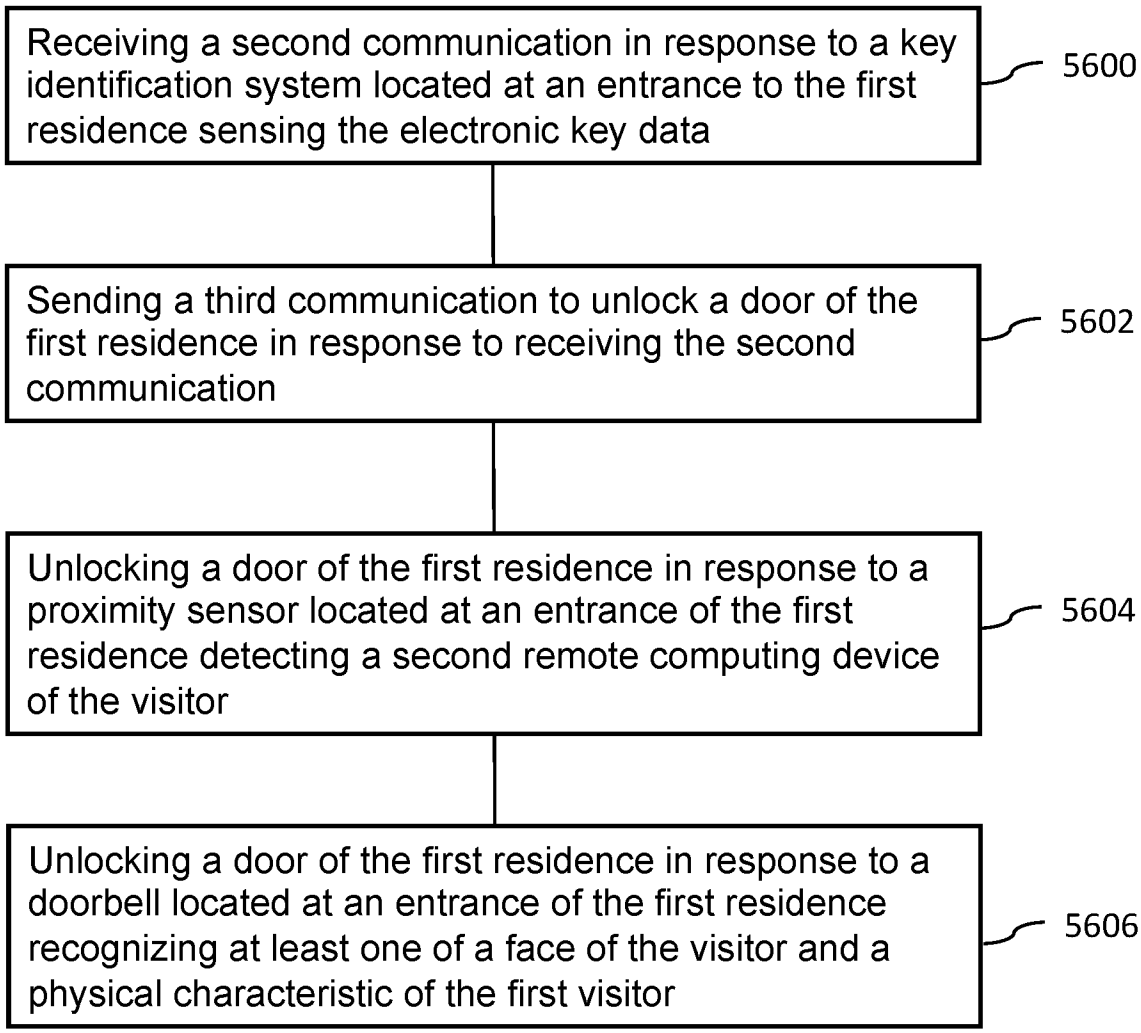
Receiving a second communication in response to a key identification system located at an entrance to the first residence sensing the electronic key data
5600
Sending a third communication to unlock a door of the first residence in response to receiving the second communication
5602
Unlocking a door of the first residence in response to a proximity sensor located at an entrance of the first residence detecting a second remote computing device of the visitor
5604
Unlocking a door of the first residence in response to a doorbell located at an entrance of the first residence recognizing at least one of a face of the visitor and a physical characteristic of the first visitor
5606

**Figure 56**

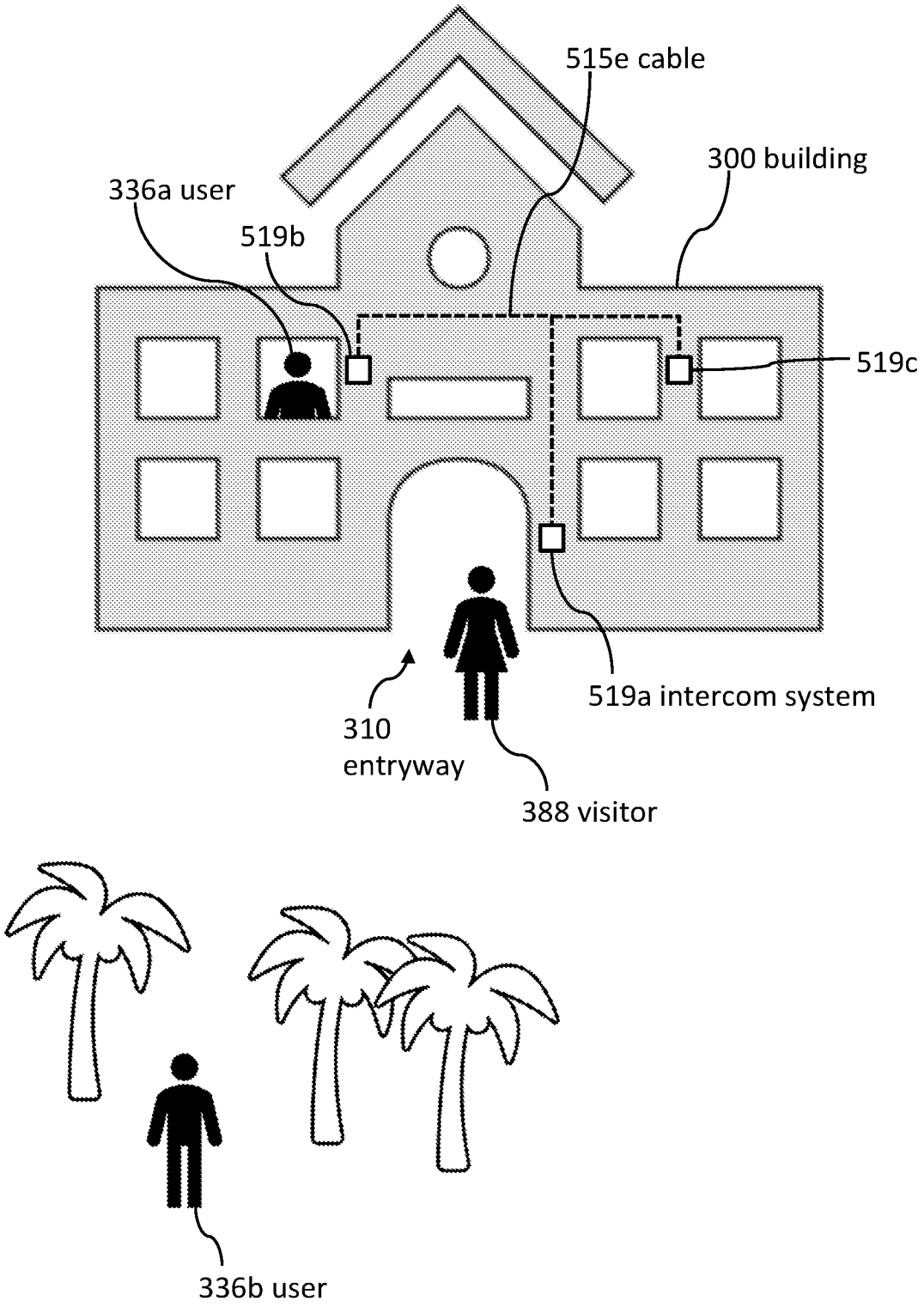
515e cable
300 building
336a user
519b
519c
519a intercom system
310
entryway
388 visitor
336b user

**Figure 57**

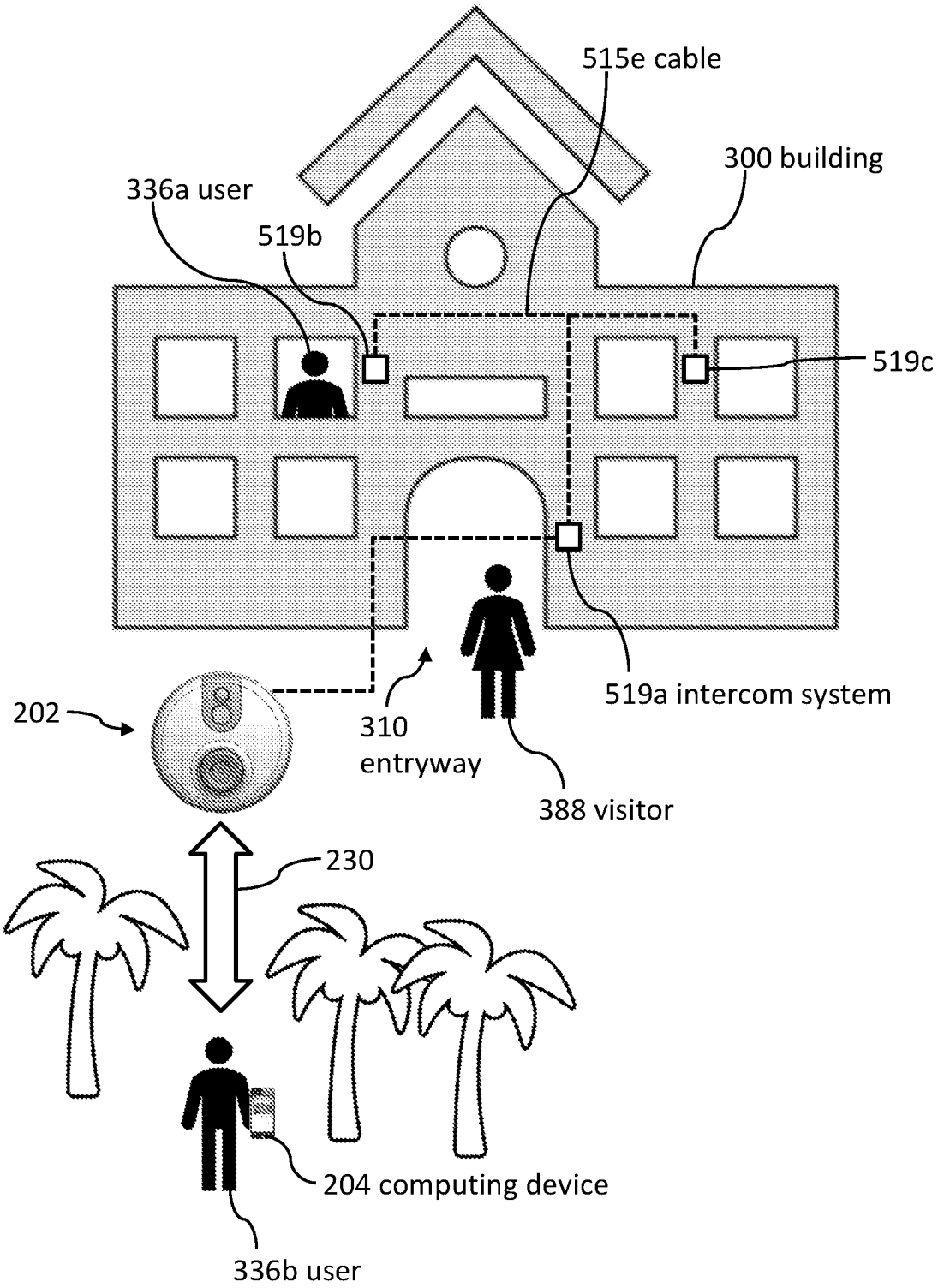
515e cable
300 building
336a user
519b
519c
519a intercom system
202
310
entryway
388 visitor
230
204 computing device
336b user

**Figure 58**

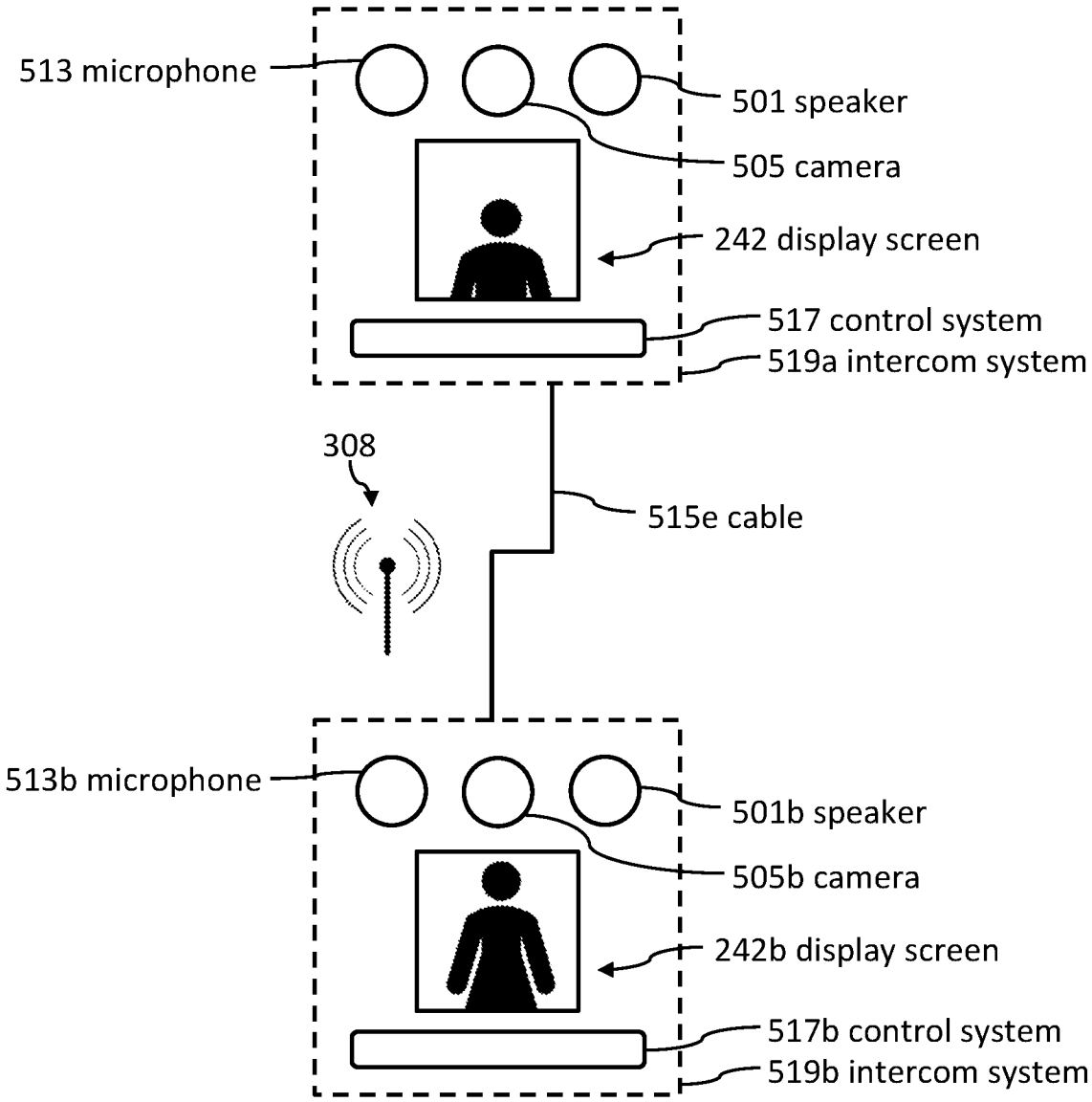
513 microphone
501 speaker
505 camera
242 display screen
517 control system
519a intercom system
308
515e cable
513b microphone
501b speaker
505b camera
242b display screen
517b control system
519b intercom system

**Figure 59**

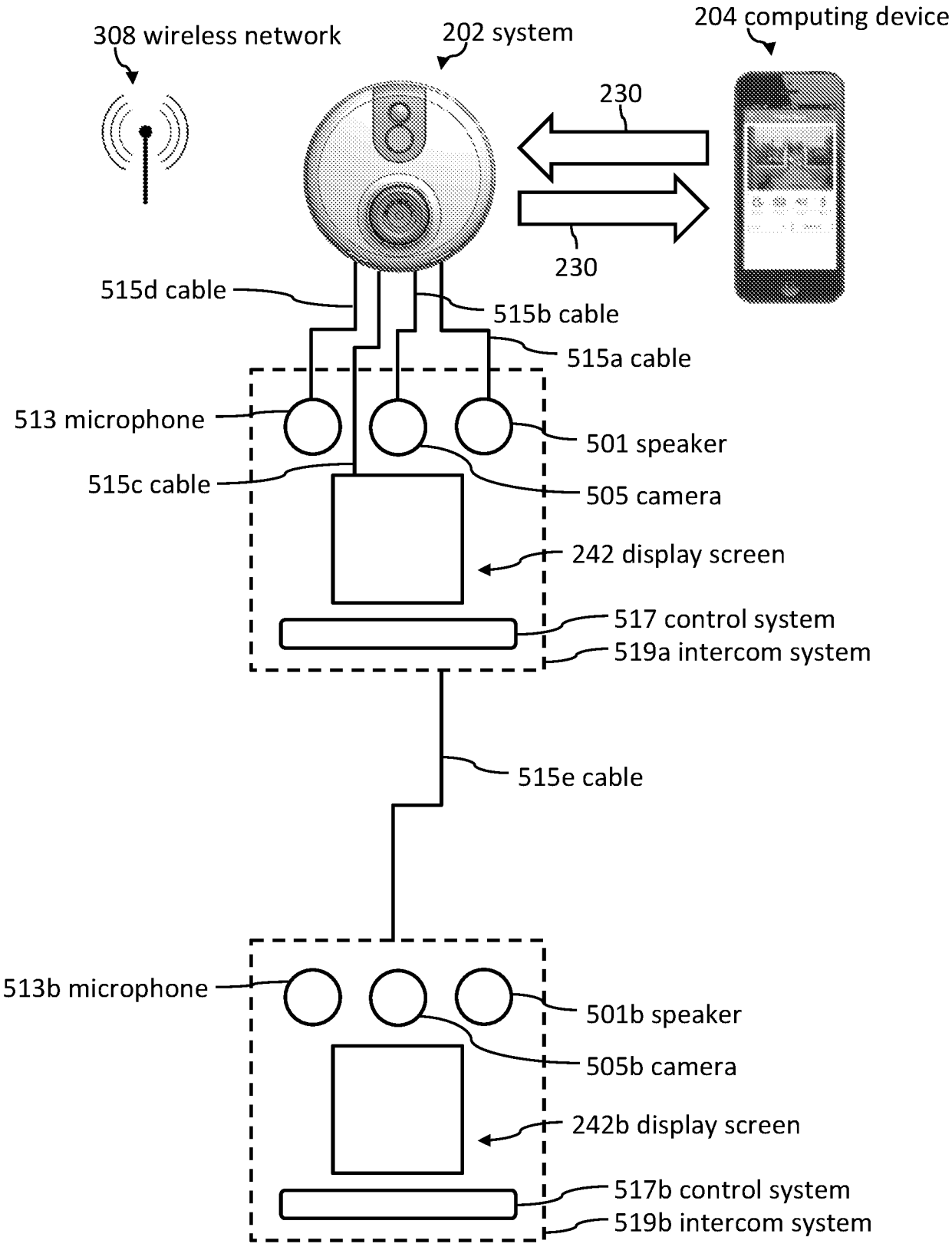
308 wireless network
202 system
204 computing device
230
230
515d cable
515b cable
515a cable
513 microphone
501 speaker
515c cable
505 camera
242 display screen
517 control system
519a intercom system
515e cable
513b microphone
501b speaker
505b camera
242b display screen
517b control system
519b intercom system

**Figure 60**

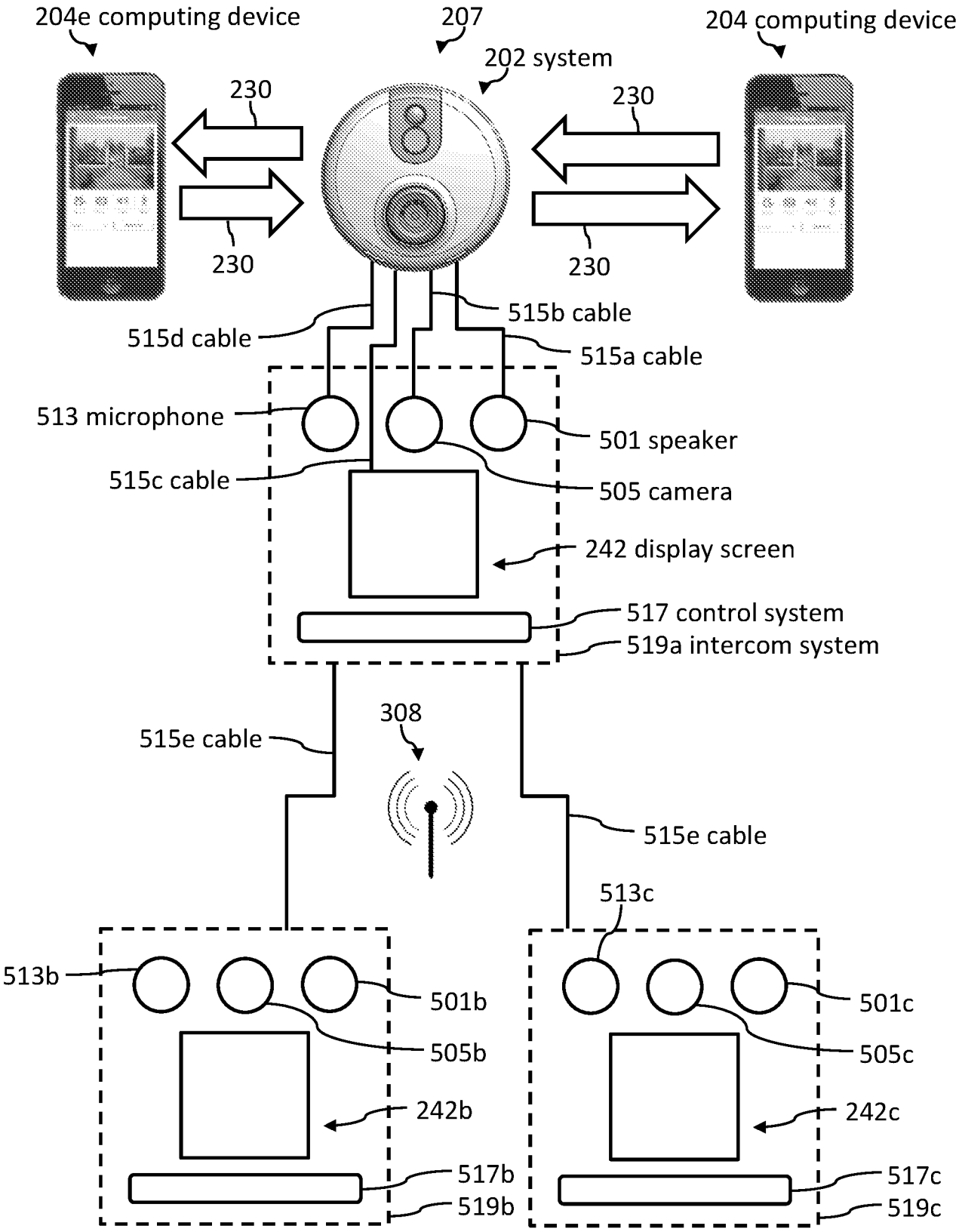
204e computing device
207
202 system
204 computing device
230
230
230
230
515b cable
515d cable
515a cable
513 microphone
501 speaker
515c cable
505 camera
242 display screen
517 control system
519a intercom system
308
515e cable
515e cable
513c
513b
501b
501c
505b
505c
242b
242c
517b
517c
519b
519c

**Figure 61**

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 18/44662

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04M 11/04; H04M 11/02 (2018.01)
CPC - G08B 13/19665; G08B 13/19678; G08B 13/19684; H04M 11/025; H04N 7/186

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)
See Search History Document

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 2013/0057695 A1 (Huisking) 07 March 2013 (07.03.2013); entire document, especially, abstract, FIG. 1, 2, para [0027]-[0032], [0034], [0035], [0037]-[0039], [0047], [0049], [0104] | 1-15 |
| A | US 2017/0201725 A1 (BOT Home Automation Inc.) 13 July 2017 (13.07.2017); Fig. 31, para [0082], [0130], [0141] | 1-15 |
| A | US 2016/0330403 A1 (BOT Home Automation Inc.) 10 November 2016 (10.11.2016); entire document | 1-15 |
| A | US 2015/0161856 A1 (Echostar Technologies LLC) 11 June 2015 (11.06.2015); entire document | 1-15 |
| A | US 9,172,922 B1 (SkyBell Technologies, Inc.) 27 October 2015 (27.10.2015); entire document | 1-15 |
| A | US 2007/0103541 A1 (Carter) 10 May 2007 (10.05.2007); entire document | 1-15 |

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

* 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 | Date of mailing of the international search report |
|---|---|
| 06 November 2018 | 19 NOV 2018 |

| Name and mailing address of the ISA/US | Authorized officer: |
|---|---|
| Mail Stop PCT, Attn: ISA/US, Commissioner for Patents<br>P.O. Box 1450, Alexandria, Virginia 22313-1450<br>Facsimile No. 571-273-8300 | Lee W. Young<br>PCT Helpdesk: 571-272-4300<br>PCT OSP: 571-272-7774 |

Form PCT/ISA/210 (second sheet) (January 2015)

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 18/44662

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: claims 1-15: drawn to a communication system configured to be at least partially coupled to a building.

Group II: claims 16-25: drawn to a doorbell system.

Group III: claims 26-35: drawn to a method of using a doorbell system to enable an occupant to grant a visitor access to a building.

Group IV: claims 36-49: drawn to a method of using a doorbell system including receiving a residence identification.

---See Continuation on Supplemental Page---

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-15

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Continuation of Box No. III - Observations where unity of invention is lacking (Continuation of item 3 of first sheet) -

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special technical features:
Group I requires a third communication device with wireless communication means, not found in the other groups.

Group II requires a camera, not found in the other groups.

Group III requires a remote serve that determines a location of the doorbell system based upon an Internet protocol address of the doorbell system, not found in the other groups.

Group IV requires sending a plush notification in response to receiving a residence ID. ta source of near parabolic pulses, not found in the other groups.

Shared Features:
The only technical features shared by Groups I-IV that would otherwise unify the groups are a communication system at least partially coupled to a building for notifying a person at a second location of a visitor.

The only additional technical features shared by Groups II and III that would otherwise unify the groups are he steps of unlocking a lock of a doorbell system.

However, these shared technical features do not represent a contribution over prior art, because the shared technical features are disclosed by US 2017/0201725 A1 to BOT Home Automation Inc. (hereinafter 'Bot') 13 July 2017 (13.07.2017), which discloses a communication system at least partially coupled to a building for notifying a person at a second location of a visitor and unlocks a lock in a doorbell system (para [0082], [0130], [0141] -Wireless Communication Doorbell 61 may be compatible with a smart lock, such as Lockitron.TM., which allows User 62 to lock and unlock a door through the use of a smart device application, such as Third Party Application 57. -FIG. 31 is a flow chart showing an operation of one aspect of the present disclosure. At step 200, a visitor may press Button 133 on the Wireless Communication Doorbell. At step 202, the Communications Module 164 sends a request to a server. Once the server receives the request, at step 204 the server may connect the Wireless Communication Doorbell 130 to the User's mobile device. This may be done through various wireless communication networks such as but not limited to available cellular, Bluetooth, or satellite networks. At step 210, the User may receive a notification on their mobile device prompting them to either accept or deny. If the user elects to deny the notification, then at step 214 the session ends and the connection between the Wireless Communication Doorbell 130 and the User's mobile device may be severed. If the user elects to accept the notification, then at step 212 the User speaks to the visitor through the mobile device while being provided audio and/or video data captured by the Camera 134, Microphone 158, and other sensors.)

As the shared technical features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups.

Groups I-IV therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.