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(54) Title: DELIVERY OF ALARM SYSTEM EVENT DATA AND AUDIO OVER HYBRID NETWORKS

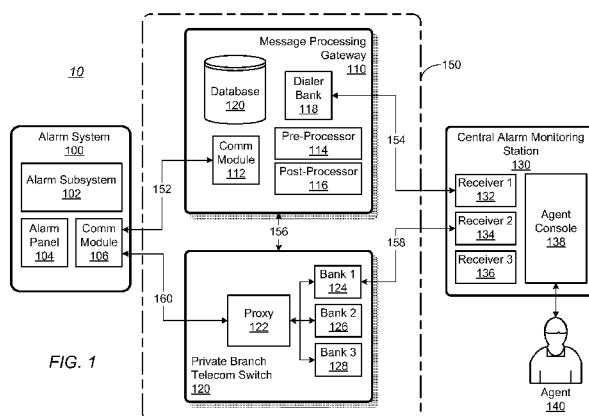


FIG. 1

(57) **Abstract:** Delivery of alarm system event data and audio over hybrid networks is described. In one embodiment, delivering alarm system event data includes detecting an alarm event and communicating alarm event data to a message processing gateway, evaluating service parameters of the alarm system and conditions of the alarm event data, forwarding the alarm event data and a voice channel code to a telecommunications switch, and opening a voice channel between the telecommunications switch and a central alarm monitoring station. In other aspects, delivering alarm system event data and connecting a voice channel further includes determining whether the voice channel remains open, forwarding a routing code to the alarm system, opening a voice channel between the alarm system and the telecommunications switch, and bridging the voice channel between the telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system and the telecommunications switch.

**TITLE OF THE INVENTION****DELIVERY OF ALARM SYSTEM EVENT DATA AND AUDIO OVER HYBRID  
NETWORKS****5 CROSS-REFERENCE TO RELATED APPLICATION**

This application claims the benefit of U.S. Provisional Application No. 61/471,558, filed April 4, 2011, the entire contents of which is hereby incorporated herein by reference.

**TECHNICAL FIELD**

10 The present invention generally relates to a system and method for efficient delivery of alarm system event data and audio over hybrid telecommunications networks. Audio call activity is minimized between an alarm system and a central alarm monitoring station, reducing costs as compared to conventional systems and methods.

**15 BACKGROUND**

Historically, security alarm systems have relied upon the Public Switched Telephone Network (PSTN) to connect an alarm system to a central alarm monitoring station, so that alarm event data may be communicated from the alarm system to the central alarm monitoring station. These conventional alarm systems are configured to place an audio-band voice call to the central  
20 alarm monitoring station and transmit alarm event data to the central alarm monitoring station using (DTMF) touch tone codes, for example. Alarm systems equipped with two-way voice or ambient sound listening functionality have relied upon the same PSTN connection to connect a two-way audio-band voice call between the alarm system and the central alarm monitoring

station. In this manner, an agent at the central alarm monitoring station is able to listen to ambient sounds captured by microphones at the premises where the alarm system is installed via the audio-band voice call. Similarly, the voice of the agent is communicated via the audio-band voice call and amplified by speakers and associated circuitry of the alarm system.

5           Some alarm systems substitute wireless radio communications services, such as cellular radiotelephone service, for the PSTN. In these systems, both alarm event data and voice are communicated over a two-way audio-band voice channel between the alarm system and the central alarm monitoring system using the cellular radiotelephone service. Other alarm systems substitute Voice over IP (VoIP) communications services for the PSTN. These systems also  
10       communicate both alarm event data and voice over a two-way audio-band voice channel established using the VoIP service.

          It is noted that, for conventional alarm systems equipped with two-way voice functionality, a two-way voice channel may be automatically and/or necessarily established upon the occurrence of every alarm event. That is, the voice channel is established by the alarm  
15       system regardless of the type of the alarm event or any other considerations. Especially for alarm systems that substitute cellular radiotelephone service for the PSTN, costs associated with establishing and maintaining the voice channel are high.

          Further, while conventional alarm systems are configured to establish and maintain a voice channel upon the occurrence of every alarm event, flexibility is lost, because the necessity  
20       to establish and maintain the voice channel is not evaluated by any means. In some systems, a service provider of alarm system monitoring services may have no ability to modify the configuration of monitored alarm systems, for example, if subscribers desire to terminate two-way voice monitoring services for lower costs.

The present invention is directed to addressing the deficiencies of the above-discussed conventional systems and methods by efficiently delivering alarm system event data and audio over hybrid telecommunications networks.

## 5 SUMMARY OF THE INVENTION

Delivery of alarm system event data and audio over hybrid networks is described. In one embodiment, a method for delivery of alarm system event data and connecting a voice channel is described including detecting, by an alarm system, an alarm event, communicating, by the alarm system, alarm event data to a message processing gateway, the alarm event data being  
10 representative of the alarm event, evaluating, by the message processing gateway, service parameters of the alarm system and conditions of the alarm event data, forwarding, by the message processing gateway, the alarm event data and a voice channel code to a private branch telecommunications switch if certain service parameters of the alarm system and conditions of the alarm event data are met, and opening, by the private branch telecommunications switch, a  
15 voice channel between the private branch telecommunications switch and a central alarm monitoring station and communicating the alarm event data and the voice channel code to the central alarm monitoring station. In other aspects, the method further includes determining, by the private branch telecommunications switch, whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open after  
20 communication of the alarm event data and the voice channel code to the central alarm monitoring station, forwarding, by the private branch telecommunications switch, a routing code to the alarm system in response to a determination that the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open,

opening, by the alarm system, a voice channel between the alarm system and the private branch telecommunications switch in response to a receipt of the routing code, and bridging, by the private branch telecommunications switch, the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel  
5 between the alarm system and the private branch telecommunications switch, to create a voice channel between the alarm system and the central alarm monitoring station.

In additional aspects, evaluating service parameters of the alarm system and the alarm event data comprises at least one of determining whether an IP address associated with the alarm system or an ID of the alarm system is provisioned at the message processing gateway,  
10 determining whether the alarm system is associated with an active customer account, determining whether the alarm system is capable and configured for a two-way voice channel, and determining whether an alarm event associated with the alarm event data requires a voice channel.

In other aspects, forwarding the alarm event data and the voice channel code further  
15 includes forwarding the alarm event data and the voice channel code to the private branch telecommunications switch when it is determined that the alarm event associated with the alarm event data requires a voice channel. Further, communicating the alarm event data to the message processing gateway comprises communicating an identifier of the alarm system to the message processing gateway, the routing code comprises a routing number of the private branch  
20 telecommunications exchange and the identifier of the alarm system, and bridging the voice channels comprises bridging the voice channels based on the identifier of the alarm system.

In still other aspects, the method further includes determining, by the private branch telecommunications switch, whether the voice channel between the private branch

telecommunications switch and the central alarm monitoring station remains open, after the voice channel between the alarm system and the private branch telecommunications switch is opened by the alarm system in response to a receipt of the routing code, and indicating, by the private branch telecom switch, that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected, when it is determined by the private branch telecom switch that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected. Additionally, the method further includes communicating, by the message processing gateway, the alarm event data to the central alarm monitoring system if the certain service parameters of the alarm system and the alarm event data are not met.

In another embodiment a system for delivery of alarm system event data and connecting a voice channel is described including an alarm system configured to detect an alarm event, and communicate alarm event data representative of the alarm event, a message processing gateway configured to receive the alarm event data from the alarm system, evaluate service parameters of the alarm system and conditions of the alarm event data, and forward the alarm event data and a voice channel code if certain service parameters of the alarm system and conditions of the alarm event data are met, and a private branch telecommunications switch configured to open a voice channel between the private branch telecommunications switch and a central alarm monitoring station and communicate the alarm event data and the voice channel code to the central alarm monitoring station, determine whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station, and forward a routing code to the alarm system in response to a

determination that the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open.

In additional aspects, the alarm system is further configured to open a voice channel between the alarm system and the private branch telecommunications switch in response to a receipt of the routing code, and the private branch telecommunications switch is further configured to bridge the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system and the private branch telecommunications switch, to create a voice channel between the alarm system and the central alarm monitoring station. The message processing gateway is further configured to determine whether an IP address associated with the alarm system or an ID of the alarm system is provisioned at the message processing gateway, determine whether the alarm system is associated with an active customer account, determine whether the alarm system is capable and configured for a two-way voice channel, and determine whether an alarm event associated with the alarm event data requires a voice channel. The message processing gateway is further configured to forward the alarm event data and the voice channel code to the private branch telecommunications switch when it is determined that the alarm event associated with the alarm event data requires a voice channel.

In other aspects, the alarm system is further configured to communicate an identifier of the alarm system to the message processing gateway, and the routing code comprises a routing number of the private branch telecommunications exchange and the identifier of the alarm system. Further, the private branch telecommunications switch is configured to bridge the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system and the private branch

telecommunications switch based on the identifier of the alarm system. In another aspect, the private branch telecommunications switch is further configured to determine whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open, after the voice channel between the alarm system and the private branch telecommunications switch is opened by the alarm system in response to a receipt of the routing code, and indicate that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected, when it is determined that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected. Further, the message processing gateway is configured to communicate the alarm event data to the central alarm monitoring system if the certain service parameters of the alarm system and the alarm event data are not met.

In another embodiment, a method for delivery of alarm system event data and connecting a voice channel is described including receiving alarm event data representative of an alarm event from an alarm system, evaluating, by a computing device, service parameters of the alarm system and conditions of the alarm event data, opening a voice channel between the computing device and a central alarm monitoring station and communicating the alarm event data and a voice channel code to the central alarm monitoring station if certain service parameters of the alarm system and conditions of the alarm event data are met, determining, by the computing device, whether the voice channel between the computing device and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station, generating and forwarding, by the computing device, a routing code to the alarm system in response to a determination that the voice channel between the computing device and the central alarm monitoring station remains

open, opening a voice channel between the alarm system and computing device after forwarding the routing code to the alarm system, and bridging, by the computing device, the voice channel between the computing device and the central alarm monitoring station and the voice channel between the alarm system and the computing device, to create a voice channel between the alarm  
5 system and the central alarm monitoring station.

In still another embodiment an apparatus for delivery of alarm system event data and connecting a voice channel is described including a message processing gateway configured to receive alarm event data representative of an alarm event from an alarm system, evaluate service parameters of the alarm system and conditions of the alarm event data, and forward the alarm  
10 event data and a voice channel code if certain service parameters of the alarm system and conditions of the alarm event data are met, and a private branch telecommunications switch configured to receive the alarm event data and the voice channel code, open a voice channel between the private branch telecommunications switch and a central alarm monitoring station and communicate the alarm event data and the voice channel code to the central alarm  
15 monitoring station, determine whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station, generate and forward a routing code to the alarm system in response to a determination that the voice channel between the private branch telecommunications switch and  
20 the central alarm monitoring station remains open, open a voice channel between the alarm system and the private branch telecommunications switch after forwarding the routing code to the alarm system, and bridge the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system

and the private branch telecommunications switch, to create a voice channel between the alarm system and the central alarm monitoring station.

These and other aspects, objects, features, and embodiments will become apparent to a person of ordinary skill in the art upon consideration of the following detailed description of illustrative embodiments exemplifying the best mode for carrying out the invention as presently perceived.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

For a more complete understanding of the invention and the advantages thereof, reference is now made to the following description, in conjunction with the accompanying figures briefly described as follows:

FIG. 1 illustrates a system for efficient delivery of alarm system event data and audio over hybrid networks;

FIG. 2 illustrates a process flow diagram of a method for delivering alarm system event data and connecting a two-way voice channel;

FIG. 3 further illustrates a process flow diagram of a method for delivering alarm system event data and connecting a two-way voice channel;

FIG. 4 further illustrates a process flow diagram of a method for delivering alarm system event data and connecting a two-way voice channel;

FIG. 5 illustrates a process flow diagram of a method for evaluating service parameters of an alarm system and alarm event data; and

FIG. 6 illustrates a general purpose computer to implement one or more elements of a system for efficient delivery of alarm system event data and audio over hybrid networks.

**DETAILED DESCRIPTION**

In the following paragraphs, the present invention will be described in further detail by way of example with reference to the attached drawings. In the description, well known components, methods, and/or processing techniques are omitted or briefly described so as not to obscure the invention. As used herein, the “present invention” refers to any one of the embodiments of the invention described herein and any equivalents. Furthermore, reference to various feature(s) of the “present invention” is not to suggest that all embodiments must include the referenced feature(s).

Among embodiments, some aspects of the present invention are implemented by a computer program executed by one or more processors, as described and illustrated. As would be apparent to one having ordinary skill in the art, the present invention may be implemented, at least in part, by computer-readable instructions in various forms, and the present invention is not intended to be limiting to a particular set or sequence of instructions executed by the processor.

Turning now to the drawings, in which like numerals indicate like elements throughout, exemplary embodiments of the invention are described in detail.

FIG. 1 illustrates an exemplary system 10 for efficient delivery of alarm system event data and audio over hybrid networks. As illustrated, the system 10 includes an alarm system 100, a message processing gateway 110, a private branch telecommunications switch 120, and a central alarm monitoring station 130. The alarm system 100 comprises an alarm subsystem 102, an alarm panel 104, and a communications module 106. The alarm subsystem 102 includes one or more sensors for detecting various types of alarm events, such as fire, burglary, or medical emergency. As a non-limiting example subset of sensors for detecting fires and burglaries, the

alarm subsystem 102 may include wired and/or wireless magnetic window and door sensors, glass-break sensors, infra-red sensors, motion sensors, smoke detectors, and carbon monoxide sensors. The alarm subsystem 102 may further comprise one or more sirens, speakers, and microphones for sounding an alarm, capturing sounds within a premises at which the alarm system 100 is installed, and amplifying a voice of an agent as described in further detail below. The alarm panel 104 comprises a display illustrating a current status of the alarm system 100 and a keypad including buttons and/or other controls to configure the alarm system 100, for example. A user of the alarm system 100 is able to determine a current status of the alarm system 100 by viewing the display of the alarm panel 104. The user is also able to call for fire, police, and medical emergency personnel using the keypad of the alarm panel 104. The alarm system 100 further comprises other wiring and associated circuitry necessary for alarm systems as understood in the art. The alarm system 100 may be installed at any location including a home or office building.

The communications module 106 comprises circuitry and associated firmware and/or software for establishing data and voice channels with other communications modules. Particularly, the communications module 106 is configured to establish data and voice channels with other communications modules using industry standard communications protocols and communications links. In various embodiments, the communications module 106 comprises circuitry and associated firmware and/or software layers to communicate over wired and/or wireless networks such as twisted pair telephone lines, computer network cables, coaxial cables, WiFi, WiMAX, satellite, and cellular communications networks. In various embodiments, the communications module 106 is configured to communicate over industry standard cellular communications networks such as Global System for Mobile Communications (“GSM”)

networks, Code Division Multiple Access (“CDMA”) spread spectrum networks, Long Term Evolution (LTE) networks, and mobile WiMAX networks, for example. Thus, the communications module 106 may be configured to establish data and voice channels over the Public Switched Telephone Network (“PSTN”), Voice over IP (“VoIP”) communications links, and wireless cellular communications links. The communications module 106 may be further configured to communicate data using various signaling techniques and packet-based protocols such as Dual-Tone Multi-frequency (“DTMF”) signaling, Transmission Control Protocol (“TCP”), and User Datagram Protocol (“UDP”), for example. In one embodiment, the communications module 106 communicates data using a packet-based mobile data service such as General Packet Radio Service (“GPRS”), for example. It is noted that, especially for cellular communications networks, the cost of communicating data over a data channel may vary as compared to the cost of communicating voice over a voice channel, because the resources required for communicating data in discrete amounts is generally lower than the resources required to open and maintain a voice channel.

In operational aspects, the alarm system 100 is configured to detect an alarm event using one or more of the sensors of the alarm subsystem 102 or the alarm panel 104, and communicate associated alarm event data to the message processing gateway 110 using a data channel established between the alarm system 100 and the message processing gateway 110. In one embodiment, the alarm system 100 may communicate alarm event data in the alarm industry standard Contact ID format. Accordingly, the alarm system 100 may communicate the Contact ID event codes “100,” “120,” or “130” for fire, panic, and burglary alarms, respectively, as understood in the art. According to additional aspects, the alarm system 100 is also configured to open a voice channel between the alarm system 100 and the private branch

telecommunications switch 120 in response to a receipt of a routing code after transmission of the alarm event data, as described in further detail below.

The message processing gateway 110 comprises, but is not limited to, a communications module 112, a pre-processor 114, a post-processor 116, a dialer bank 118, and a database 120.

5 The communications module 112 is configured to communicate over one or more types of communications networks and is similar to the communications module 106. Particularly, the communications module 112 is configured to establish data and voice channels with the communications module 106 via the communications link 152, which may comprise one or more wired or wireless communications links. The pre-processor 114 is configured to perform  
10 overhead functions of outbound network communications such as encoding and packetizing data. The post-processor 116 is configured to decode and process data received by the communications module 112. In one embodiment, the dialer bank 118 is configured to establish a voice channel call to the central alarm monitoring station 130 via the communications link 154, which may comprise one or more wired or wireless communications links including the PSTN.  
15 The dialer bank 118 may be further configured to communicate data, including alarm event data received from the alarm system 100, to the central alarm monitoring station 130 using DTMF signaling over the voice channel.

The database 120 comprises one or more computer-readable storage devices that store computer-executable program code as well as data related to alarm systems, accounts of alarm  
20 monitoring subscribers, alarm system event data, and other associated data. For example, the database 120 may store data associated with a plurality of alarm monitoring subscriber accounts for billing and other purposes. The account data and other associated information stored in the database 120 may be maintained and updated via a network interface by account owners such as

alarm services dealers. The alarm system event data may be maintained and updated by the post-processor 116. It is noted that the message processing gateway 110 provides and facilitates alarm monitoring services for a plurality of alarm systems in addition to the alarm system 100. As such, the database 120 stores data related to a plurality of alarm systems in addition to the  
5 alarm system 100.

In operational aspects, the message processing gateway 110 is configured to receive alarm event data representative of an alarm event from the alarm system 100, evaluate service parameters of the alarm system 100 and the alarm event data, and forward the alarm event data along with associated information to the private branch telecommunications switch 120 if certain  
10 service parameters of the alarm system and the alarm event data are met. A more detailed description of the processes of the message processing gateway 100 are provided below.

The private branch telecommunications switch 120 comprises one or more proxies 122 and at least one bank of communications modules. Particularly, the private branch telecommunications switch 120, as illustrated, includes three communications banks 124, 126,  
15 and 128. The private branch telecommunications switch 120 may comprise additional or fewer communications banks among embodiments. In one embodiment, the message processing gateway 110 and the private branch telecommunications switch 120 comprise separate computing devices, and the private branch telecommunications switch 120 is communicatively coupled to the message processing gateway 110 via the communications link 156. The  
20 communications link 156 may comprise one or more wired or wireless communications links. The private branch telecommunications switch 120 and the message processing gateway 110 may communicate using Application Programming Interface (“API”) web services over the Internet or other public and/or private networks. In other embodiments, the private branch

telecommunications switch 120 and the message processing gateway 110 may be integrated into a single computing device, as designated by the hashed outline 150.

The communications banks 124, 126, and 128 are configured to establish a voice channel to the central alarm monitoring station 130 over the communications link 158, which may  
5 comprise one or more wired or wireless communications links including the PSTN. It is noted that the communications link 158 may comprise communications links other than the PSTN, such as the Internet. As compared to the dialer bank 118, the communications banks 124, 126, and 128 may comprise additional circuitry, firmware, and/or software to facilitate two-way voice  
10 communications over the voice channel established between the private branch telecommunications switch 120 and the central alarm monitoring station 130. For example, the dialer bank 118 may comprise circuitry for establishing a voice channel and communicating data using the limited number of DTMF tones but not circuitry for facilitating a two-way audio-band voice conversation between individuals.

In operational aspects, the private branch telecommunications switch 120 is configured to  
15 open a voice channel to the central alarm monitoring station 130 and communicate the alarm event data and associated information received from the message processing gateway 120 to the central alarm monitoring station 130. In additional aspects, the private branch telecommunications switch 120 is further configured to determine whether the voice channel  
20 between the private branch telecommunications switch 120 and the central alarm monitoring station 130 remains open after the alarm event data and associated information is communicated to the central alarm monitoring station 130. The private branch telecommunications switch 120 is further configured to generate and forward a routing code to the alarm system 100 in response to a determination that the voice channel between the private branch telecommunications switch

120 and the central alarm monitoring station 130 remains open and bridge a voice channel between the alarm system 100 and the central alarm monitoring station 130.

The central alarm monitoring station 130 comprises at least one agent console 138 and a plurality of receiver modules 132, 134, and 136. The central alarm monitoring station is staffed  
5 by personnel including agent 140. As illustrated in FIG. 1, the agent 140 is able to view the agent console 138, which displays information associated with received alarm event data from alarm systems. For example, after receiving alarm event data and associated information from the alarm system 100 and the message processing gateway 110, the agent console 138 may display details related to an alarm event occurring at a location where the alarm system 100 is  
10 installed. For example, based on alarm event data received from the alarm system 100, the agent console 138 may indicate that a fire, panic, burglary, or medical emergency is occurring at a home or office where the alarm system 100 is installed. Additionally, the agent console 138 may display a street address or geographic coordinates of the home or office with contact information for fire, police, and medical services. Based on the display, the agent 140 is able to assess the  
15 event where the alarm system 100 is installed. Generally, the central alarm monitoring station 130 facilitates monitoring alarm systems installed at a plurality of locations by one or more agents that assess alarm events and, sometimes, contact service personnel based upon alarm event data received from the alarm systems. For example, the agents monitoring alarm systems at the central alarm monitoring station 130 may call for fire, police, or medical service personnel  
20 to be dispatched based on alarm event data received from a plurality of monitored alarm systems.

When an alarm system includes two-way voice functionality, a voice channel may be established between the alarm system and the central alarm monitoring station 130. As such, the agent 140 at the central alarm monitoring station 130 is able to listen to ambient sounds captured

by microphones of an alarm system, for example, at a location where the alarm system is installed. The sounds may be communicated over a voice channel established between the alarm system and the central alarm monitoring station 130. The agent is also able to speak into a handset or headset microphone, for example, at the central alarm monitoring station 130, and the agent's voice may be communicated over the voice channel and amplified over speakers at the location where the alarm system is installed. As described herein, an alarm system comprising "two-way voice functionality" is capable of establishing a full-duplex voice-band audio link between the alarm system and an alarm monitoring station. Using the two-way voice functionality, the agent 140 is able to assess any ambient sounds captured at a location where an alarm system is installed in connection with received alarm event data. For example, the agent 140 may be able to hear one or more persons committing a crime in connection with alarm event data indicating a burglary event and warn those persons that police have been dispatched. In another example, the agent may be able to hear an individual's request for medical assistance.

As compared to conventional alarm systems, the exemplary system 10 of the present invention is configured to establish a voice channel using a method that reduces an amount of time the two-way voice channel is established and maintained between the alarm system 100 and the central alarm monitoring station 130. Further, the exemplary system 10 is configured to establish the voice channel only if certain service parameters of the alarm system and conditions of the alarm event data are met.

As described in further detail below, when an alarm event is detected, the alarm system 100 is configured to establish a data connection to the message processing gateway 110 using the communications module 106 and communicate alarm event data to the message processing gateway 110 before a voice channel is established. In turn, the message processing gateway 110

is configured to forward the alarm event data to the central alarm monitoring station 130 via the private branch telecommunications switch 120 if certain service parameters of the alarm system 100 and the alarm event data are met - before the voice channel is established. The voice channel is established at a later time after the alarm system 100 receives a routing code from the private branch telecommunications switch 120, as described in further detail below with reference to FIGS. 2-5.

Before turning to the process flow diagrams of FIGS. 2-5, it is noted that the present invention may be practiced using an alternative order of the steps illustrated in FIGS. 2-5. That is, the process flows illustrated in FIGS. 2-5 are provided as examples only, and the present invention may be practiced using process flows that differ from those illustrated. Additionally, it is noted that not all steps are required in every embodiment. In other words, one or more of the steps may be omitted or replaced, without departing from the spirit and scope of the invention. In alternative embodiments, steps may be performed in different orders, in parallel with one another, or omitted entirely, and/or certain additional steps may be performed without departing from the scope and spirit of the invention.

Turning to FIG. 2, a method 200 for delivering alarm system event data and connecting a two-way voice channel is illustrated. At step 210, the alarm system 100 detects an alarm event. For example, the alarm system 100 may detect a fire, burglary, or medical emergency using one or more of the sensors of the alarm subsystem 102 or according to a button pressed on the keypad of the alarm panel 104. In other words, the alarm event may be responsive to the sensors of the alarm system 102 or an individual's request for attention using the alarm panel 104. At step 220, the alarm system 100 communicates alarm event data associated with the detected alarm event to the message processing gateway 110 using a data channel established by the

communications module 106. For example, the alarm system 100 may communicate the alarm event data as one or more packets of data using a data communications protocol over the communications channel 152 without relying on the establishment of a voice channel. In one embodiment, the alarm event data is formatted in the industry standard Contact ID format. The alarm system 100 may also communicate information in addition to the alarm event data, such as a device ID of the alarm system 100. The device ID may be a serial number of the alarm system 100, a serial number of the communications module 106, an IP address assigned to the communications module 106, or other unique identification data associated with the alarm system 100.

At step 230, the message processing gateway 110 evaluates service parameters of the alarm system 100 and the data received from the alarm system 100. Based on the evaluation at step 230, the message processing gateway 110 determines whether to open a two-way voice channel at step 240. As described in further detail below with reference to FIG. 5, the message processing gateway 110 evaluates service parameters of the alarm system 100 and the data received from the alarm system 100 to determine whether the alarm system 100 and the central alarm monitoring station 130 are to be connected via a two-way voice channel. For example, the message processing gateway 110 determines whether to open the voice channel based on whether certain service parameters of the alarm system 100 and conditions of the data received from the alarm system 100 are met. The parameters of the alarm system and conditions of the data may be determined with reference to data stored in the database 120, as described in further detail below.

If the message processing gateway 110 determines that a voice channel is not to be opened between the alarm system 100 and the central alarm monitoring station 130 at step 240,

the message processing gateway 110 proceeds to step 250 and communicates the alarm event data received from the alarm system 100 to the central alarm monitoring station 130 via the communications link 154. That is, the message processing gateway 110 establishes a communications channel to the central alarm monitoring station 130 via communications link 5 154 using the dialer bank 188 and the receiver module 132. After establishing the communications channel, the message processing gateway 110 communicates the alarm event data received from the alarm system 100 to the central alarm monitoring station 130 using DTMF tones, for example. It is noted that the message processing gateway 110 may communicate data to the central alarm monitoring system 130 in addition to the alarm event data.

10 For example, the message processing gateway 110, when evaluating the service parameters of the alarm system 100 at step 230, may query the database 120 to gather account data associated with the alarm system 100 such as associated phone number(s) of central alarm monitoring station(s), account numbers, billing information, subscriber names, serial numbers, and IP addresses of the alarm system 100. In turn, the message processing gateway 110 may

15 communicate one or more of these additional data items, such as account number(s), to the central alarm monitoring station 130 when communicating the alarm event data.

Based on the alarm event data and any other associated information received from the message processing gateway 110, the agent console 138 is updated with a display of the alarm event detected by the alarm system 100, and the process ends at step 260 after the central alarm

20 monitoring station 130 has received the alarm event data. In this case, according to the evaluation of the service parameters of the alarm system 100 and conditions of the data received from the alarm system 100 at step 230, no voice channel is connected between the alarm system 100 and the central alarm monitoring system 130. As such, the agent 140 determines whether to

contact emergency personnel such as police, fire, or medical personnel based on the updated display of the agent console 138 without the additional benefit of the voice channel. The agent 140 may alternatively or additionally determine whether to contact service personnel, for example, if the event data indicates a building system failure.

5           On the other hand, if the message processing gateway 110 determines that a voice channel is to be opened between the alarm system 100 and the central alarm monitoring station 130 at step 240, the message processing gateway 110 proceeds to step 270 and forwards the alarm event data received from the alarm system 100 to the central alarm monitoring station 130 via the communications link 156. In other words, the message processing gateway 110  
10 establishes a communications channel to the private branch telecommunications switch 120 via the communications link 156 using a web services API link over the Internet, for example. After establishing the communications channel, the message processing gateway 110 communicates the alarm event data received from the alarm system 100 to the private branch telecommunications switch 120. It is noted that, among embodiments, the message processing  
15 gateway 110 may communicate the alarm event data to the private branch telecommunications switch 120 using communications channels and/or protocols other than the web-services API link. Also, the message processing gateway 110 may forward data to the private branch telecommunications switch 120 in addition to the alarm event data. For example, the message processing gateway 110, when evaluating the parameters and data of the alarm system 100 at  
20 step 230, may query the database 120 to gather account data associated with the alarm system 100, such as phone and/or account numbers, billing information, subscriber names, serial numbers, and IP addresses of the alarm system 100. In turn, the message processing gateway

110 may forward one or more of these additional data items to the private branch telecommunications switch 120.

In one aspect, as compared to when the message processing gateway 110 communicates the alarm event data to the central alarm monitoring station 130 via the communications link 154, the message processing gateway 110 also forwards a voice channel code to the private branch telecommunications switch 120 when forwarding the alarm event data via the communications link 156. Particularly, in one embodiment, the voice channel code is inserted among data forwarded to the private branch telecommunications switch 120 so that the voice channel code may be communicated to the central alarm monitoring station 130 by the private branch telecommunications switch 120. As described herein, the voice channel code comprises a code recognized by the central alarm monitoring station 130 as a command to maintain an open voice channel. As described in further detail below, the central alarm monitoring station 130 maintains the open voice channel so that a two-way voice channel may be established between the alarm system 100 and the central alarm monitoring station 130. In other words, the voice channel code comprises a code which identifies to the central alarm monitoring station 130 that the alarm system 100 comprises two-way voice functionality and is requesting a two-way voice channel.

In another aspect, the message processing gateway 110 also forwards a routing number of the central alarm monitoring system 130 to the private branch telecommunications switch 120 when forwarding the alarm event data. The routing number of the central alarm monitoring system 130 may comprise a PSTN telephone number of one of the receiver modules 132, 134, and 136 or a Session Initiation Protocol ("SIP") address or IP address of the central alarm monitoring station 130, for example. The private branch telecommunications switch 120 may

use the routing number to establish a communications channel with the central alarm monitoring station 130 via the communications link 158.

Turning to FIG. 3, at step 310, the telecommunications switch 120 opens a voice channel with a receiver module of the central alarm monitoring station 130 using the communications bank 124 via the communications link 158. The private branch telecommunications switch 120 may open the voice channel with reference to the routing number of the central alarm monitoring station 130 received from the message processing gateway 110, for example. After opening the voice channel, the private branch telecommunications switch 120 communicates the alarm event data and other associated information received from the message processing gateway 110 to the central alarm monitoring station 130. In one embodiment, the private branch telecommunications switch 120 communicates the alarm event data, an account number of the alarm system 100, and the voice channel code. Among embodiments, the private branch telecommunications switch 120 may communicate any portion or all of the data received from the message processing gateway 110 to the central alarm monitoring station 130.

At step 320, the private branch telecommunications switch 120 determines whether the voice channel between the private branch telecommunications switch 120 and the central alarm monitoring system 130 remains open after a kiss-off or other acknowledgement from the central alarm monitoring system 130. In other words, the private branch telecommunications switch 120 determines whether the central alarm monitoring station 130 has maintained an open communications channel via the communications link 158 after the central alarm monitoring station 130 acknowledges receipt of the alarm event data and other associated information from the private branch telecommunications switch 120.

If the private branch telecommunications switch 120 determines at step 320 that the voice channel does not remain open after communication of the alarm event data to the central alarm monitoring station 130, the process ends at step 322. In alternative embodiments, the private branch telecommunications switch 120 may indicate to the message processing gateway 110 that  
5 the central alarm monitoring station 130 disconnected the voice communications channel before the process ends at step 322.

Alternatively, if the private branch telecommunications switch 120 determines at step 320 that the central alarm monitoring station 130 maintains an open voice channel after receipt of the alarm event data, the process proceeds to step 330 where the private branch telecommunications  
10 switch 120 generates and sends a routing code to the message processing gateway 110. The routing code may be determined based upon a routing address of the private branch telecommunications switch 120, an ID of the alarm system 100, and the particular one of the communications modules 124, 126, and 128 used to open the voice channel to the central alarm monitoring station 130, for example. The routing code is used by the alarm system 100 to  
15 establish a voice channel between the alarm system 100 and the private branch telecommunications switch 120.

At step 340, the message processing gateway 110 forwards the routing code to the alarm system 100 via the communications link 152. The message processing gateway 110 forwards the routing code to the alarm system 100 using a data channel between the message processing  
20 gateway 110 and the alarm system 100. Proceeding to step 350, after the alarm system 100 receives the routing code from the private branch telecommunications switch 120, the alarm system 100 opens a voice channel to the private branch telecommunications switch 120 with reference to the routing code. Particularly, the alarm system 100 uses the communications

module 106 to open a voice channel to the private branch telecommunications switch 120 via the communications link 160. In one embodiment, the routing code comprises a telephone number of the private branch telecommunications switch 120 and an ID of the alarm system 100. In another embodiment, the routing code may also include an identification number that identifies  
5 the bank of communications modules that maintains the open voice channel between the private branch telecommunications switch 120 and the central alarm monitoring station 130.

At step 360, the private branch telecommunications switch 120 determines whether the voice channel remains open between the private branch telecommunications switch 120 and the central alarm monitoring station 130. If the private branch telecommunications switch 120  
10 determines that the voice channel is no longer open at step 360, the private branch telecommunications switch 120 indicates to the alarm system 100 that the central alarm monitoring station 130 has disconnected at step 362. As one indication that the central alarm monitoring station 130 has disconnected, the private branch telecommunications switch 120 may provide a busy signal to the alarm system 100, indicating that the central alarm monitoring  
15 station 130 is unavailable.

If the private branch telecommunications switch 120 determines at step 360 that the voice channel remains open between the private branch telecommunications switch 120 and the central alarm monitoring station 130, the private branch telecommunications switch 120 bridges the voice channel established between the alarm system 100 and the private branch  
20 telecommunications switch 120 with the voice channel established between the private branch telecommunications switch 120 and the central alarm monitoring station 130. Thus, a voice channel between the alarm system 100 and the central alarm monitoring station 130 is created. After the voice channel is bridged between the alarm system 100 and the central alarm

monitoring station 130, the agent 140 is able to speak into a headset or handset microphone at the central alarm monitoring station 130 and the agent's voice may be amplified over the speakers of the alarm system 100. Additionally, the agent 140 is able to listen for sounds at a location where the alarm system 100 is installed using a microphone of the alarm system 100. The bridged voice channel continues until it is disconnected at step 420. The process ends at step 430 when the bridged voice channel is disconnected.

It is noted that, for some time after the central alarm monitoring station 130 receives data from the private branch telecommunications switch 120 at step 310, the agent 140 may not be available to listen for ambient sounds captured by the alarm system 100 due to other priorities. By the time that the voice channel is bridged between the alarm system 100 and the central alarm monitoring station 130, however, the agent 140 is more likely to be available to listen for the ambient sounds. It is further noted that the exemplary system 10 helps to reduce costs associated with maintaining a voice channel between the alarm system 100 and the central alarm monitoring station 130 while the agent 140 is busy with other priorities.

Turning to FIG. 5, an exemplary evaluation of the service parameters of the alarm system 100 and the alarm event data by the message processing gateway 110 is described in further detail. Generally, the evaluation is relied upon to determine whether a two-way voice channel is to be opened between the alarm system 100 and the central alarm monitoring station 130. The decision blocks in the evaluation illustrated in FIG. 5 are provided by way of example only, and embodiments may be implemented using fewer or additional factors, decisions, or considerations.

At step 510, the post-processor 116 of the message processing gateway 110 queries data associated with the alarm system 100 from the database 120. Particularly, the post-processor 116

of the message processing gateway 110 queries the database 120 for various types of data associated with the alarm system 100, such as account numbers, billing information, subscriber names, serial numbers, IP addresses, other service parameters of the alarm system 100. At step 520, the message processing gateway 110 evaluates the alarm system event data.

5           After the query at step 510 and the evaluation at step 520, the post-processor 116 determines whether a two-way voice channel is to be opened at decisions blocks 530, 540, 550, and 560. At step 530, the post-processor 116 determines whether the alarm system 100 is provisioned in the database 120. In other words, the post-processor 116 determines whether the alarm system 100 is registered among a known group of serviced alarm systems of the message  
10   processing gateway. To determine whether the alarm system 100 is registered, the post-processor 116 may reference an IP address or serial number of the alarm system 100 and cross-reference that information with information in the database 120. If the alarm system 100 is not among the known group of serviced alarm systems of the message processing gateway, the post-processor 116 proceeds to step 570 and it is determined that no two-way voice channel is to be  
15   opened. In this case, no voice channel is to be opened between the alarm system 100 and the central alarm monitoring system 130 because the alarm system 100 is not a provisioned customer of the system 10. Alternatively, if the alarm system 100 is among the known serviced alarm systems, the process proceeds to step 540.

          At step 540, the post-processor 116 determines whether the alarm system 100 is  
20   associated with an active alarm monitoring account. In other words, the post-processor 116 determines whether the alarm system 100 is associated with a customer account in good standing, for example. Among other aspects, the standing of a customer's account may be dependent upon an account balance for services rendered or a payment schedule of the customer.

If the alarm system 100 is not associated with a customer account in good standing, the post-processor 116 proceeds to step 570 and it is determined that no two-way voice channel is to be opened. In this case, no voice channel is to be opened between the alarm system 100 and the central alarm monitoring system 130 because the alarm system 100 is associated with a customer  
5 account that is not in good standing. Alternatively, if the alarm system 100 is associated with a customer account in good standing, the process proceeds to step 550.

At step 550, the post-processor 116 determines whether the alarm system 100 is capable of and configured for establishing a two-way voice channel between the alarm system 100 and the central alarm monitoring station 130. In one aspect, the post-processor 116 determines  
10 whether the alarm system 100 comprises the hardware necessary to facilitate the establishment of a voice channel. The post-processor 116 may cross-reference a serial number of the alarm system 100 with data stored in the database 120 to determine whether the alarm system 100 comprises the hardware required to establish a voice channel. In this context, the database 120 may store a list of hardware configurations of several different models of alarm systems which  
15 comprise the hardware necessary to establish a voice channel for reference by the post-processor 116.

In another aspect, the post-processor 116 determines whether the alarm system 100 is configured for two-way voice functionality. It is noted that, although an alarm system may comprise the hardware necessary to establish a voice channel, customers and/or service providers  
20 may choose not to use the two-way voice functionality of the alarm system. Even for alarm systems comprising the hardware for establishing a voice channel, the voice feature may be disabled at the alarm panel of the alarm system or according to one or more parameters stored in the database 120, for example. If the alarm system 100 does not comprise the hardware

necessary for establishing a voice channel or is not configured for two-way voice functionality, the post-processor 116 proceeds to step 570 and it is determined that no two-way voice channel is to be opened. Alternatively, if the alarm system 100 comprises the hardware necessary for establishing a voice channel and is configured for two-way voice functionality, the process  
5 proceeds to step 560.

At step 560, the post-processor 116 determines whether the alarm event requires a voice channel. In other words, the post-processor 116 evaluates the alarm event data to determine whether the alarm event data includes an alarm event code such as a fire, burglary, or other medical emergency code for which a voice channel may be desirable. In some cases, the alarm  
10 event data may indicate that the alarm event is associated with a system failure, such as a furnace or air conditioner failure. In these cases, a voice channel is unlikely to be beneficial to the agent 140 because of the lack of ambient sounds to interpret and individuals to speak with. In one embodiment, the post-processor 116 determines that a voice channel is required for any alarm event data associated with a fire, panic, burglary, or medical emergency. If the alarm event data  
15 is not associated with a fire, panic, burglary, or other medical emergency, the post-processor 116 proceeds to step 570 and it is determined that no two-way voice channel is to be opened. Alternatively, if the alarm event data is associated with a fire, panic, burglary, or other medical emergency, the process proceeds to step 580 and it is determined that the two-way voice channel is to be opened.

20 Thus, a voice channel is opened between the alarm system 100 and the central alarm monitoring station 130 based on the evaluation by the message processing gateway 110 of the service parameters and the alarm event data of the alarm system 100. As noted above, the voice channel is not opened automatically for all alarm events. For example, as discussed above, even

if a burglary is detected, no voice channel is opened if the alarm system 100 is configured not to open a voice channel according to the decision at step 550. As another example, even if a burglary is detected, no voice channel is opened if an account of the alarm system 100 is inactive or not in good standing according to the decision at step 540. As such, customers and service  
5 operators of alarm systems according to the system and method described herein are able to carefully define the conditions under which voice channels are opened, reducing costs as compared to conventional systems and methods.

With reference again to FIG. 2, the process turns to either step 250 when no voice channel is to be opened or to step 270 when a voice channel is to be opened, according to the  
10 evaluation at step 230 and the decision at step 240. As compared to step 250, the alarm event data is forwarded at step 270 with a voice channel code, as discussed above, to direct the central alarm monitoring station 130 to maintain an open voice channel, which is later bridged to the alarm system 100.

The message processing gateway 110 and the private branch telecommunications switch  
15 may be located at separate geographic locations. Alternatively, the message processing gateway 110 and the private branch telecommunications switch 120 may be integrated into a single computing device at one location, as designated by the hashed outline 150. In this case, the dialer bank 118 may be merged with the communications banks 124, 126, and 128 or omitted in favor of the communications banks 124, 126, and 128.

20 Turning to FIG. 6, an example hardware diagram of a general purpose computer 600 is illustrated. Any of the alarm system 100, the message processing gateway 110, the private branch telecommunications switch 120, and the central alarm monitoring system 130 may be implemented, in part, using one or more elements of the general purpose computer 600. The

computer 600 includes a processor 610, a Random Access Memory ("RAM") / Read Only Memory ("ROM") 620, a memory device 630, a PSTN interface 640, a network interface 650, and an Input Output ("I/O") interface 660. The elements of the computer 600 are communicatively coupled via a bus 602.

5           The processor 610 comprises any well known general purpose arithmetic processor or Application Specific Integrated Circuit ("ASIC"). The RAM/ROM 620 comprises any well known random access or read only memory device that stores computer-readable instructions to be executed by the processor 610. The memory device 630 stores computer-readable instructions thereon that, when executed by the processor 610, direct the processor 610 to  
10       execute various aspects of the present invention described herein. When the processor 610 comprises an ASIC, the processes described herein may be executed by the ASIC according to an embedded circuitry design of the ASIC, by firmware of the ASIC, or both an embedded circuitry design and firmware of the ASIC. As a non-limiting example group, the memory device 630 comprises one or more of an optical disc, a magnetic disc, a semiconductor memory  
15       (i.e., a flash based memory), a magnetic tape memory, a removable memory, combinations thereof, or any other known memory means for storing computer-readable instructions. The PSTN interface 640 and the network interface 650 comprise hardware interfaces to communicate over the PSTN and data networks, respectively. The I/O interface 660 comprises device input and output interfaces such as keyboard, pointing device, display, communication, and other  
20       interfaces. The bus 602 electrically and communicatively couples the processor 610, the RAM/ROM 620, the memory device 630, the PSTN interface 640, the network interface 650, and the I/O interface 660, so that data and instructions may be communicated among them. In operation, the processor 610 is configured to retrieve computer-readable instructions stored on

the memory device 640, the RAM/ROM 620, or another storage means, and copy the computer-readable instructions to the RAM/ROM 620 for execution. The processor 610 is further configured to execute the computer-readable instructions to implement various aspects and features of the present invention. For example, the processor 610 may be adapted and  
5 configured to execute the processes described above with reference to FIGS. 3-5, including the processes described as being performed by the post-processor 116. Also, the memory device 630 may store the data stored in the database 120.

Although embodiments of the present invention have been described herein in detail, the descriptions are by way of example. The features of the invention described herein are  
10 representative and, in alternative embodiments, certain features and elements may be added or omitted. Additionally, modifications to aspects of the embodiments described herein may be made by those skilled in the art without departing from the spirit and scope of the present invention defined in the following claims, the scope of which are to be accorded the broadest interpretation so as to encompass modifications and equivalent structures.

**CLAIMS**

1. A method for delivery of alarm system event data and connecting a voice channel, comprising:

detecting, by an alarm system, an alarm event;

5 communicating, by the alarm system, alarm event data to a message processing gateway, the alarm event data being representative of the alarm event;

evaluating, by the message processing gateway, service parameters of the alarm system and conditions of the alarm event data;

10 forwarding, by the message processing gateway, the alarm event data and a voice channel code to a private branch telecommunications switch if certain service parameters of the alarm system and conditions of the alarm event data are met;

opening, by the private branch telecommunications switch, a voice channel between the private branch telecommunications switch and a central alarm monitoring station and communicating the alarm event data and the voice channel code to the central alarm monitoring station;

15 determining, by the private branch telecommunications switch, whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station;

20 forwarding, by the private branch telecommunications switch, a routing code to the alarm system in response to a determination that the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open;

opening, by the alarm system, a voice channel between the alarm system and the private branch telecommunications switch in response to a receipt of the routing code; and

bridging, by the private branch telecommunications switch, the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the  
5 voice channel between the alarm system and the private branch telecommunications switch, to create a voice channel between the alarm system and the central alarm monitoring station.

2. The method of Claim 1, wherein evaluating service parameters of the alarm system and the alarm event data comprises at least one of

10 determining whether an IP address associated with the alarm system or an ID of the alarm system is provisioned at the message processing gateway;

determining whether the alarm system is associated with an active customer account;

determining whether the alarm system is capable and configured for a two-way voice channel; and

15 determining whether an alarm event associated with the alarm event data requires a voice channel.

3. The method of Claim 2, wherein forwarding the alarm event data and the voice channel code further comprises forwarding the alarm event data and the voice channel code to  
20 the private branch telecommunications switch when it is determined that the alarm event associated with the alarm event data requires a voice channel.

4. The method of Claim 1, wherein

communicating the alarm event data to the message processing gateway further comprises communicating an identifier of the alarm system to the message processing gateway, and

5 the routing code comprises a routing number of the private branch telecommunications exchange and the identifier of the alarm system.

5. The method of Claim 4, wherein bridging the voice channels comprises bridging the voice channels based on the identifier of the alarm system.

10

6. The method of Claim 4, further comprising

determining, by the private branch telecommunications switch, whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open, after the voice channel between the alarm system and the private branch telecommunications switch is opened by the alarm system in response to a receipt of the routing code; and

15

indicating, by the private branch telecom switch, that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected, when it is determined by the private branch telecom switch that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected.

20

7. The method of Claim 1, further comprising communicating, by the message processing gateway, the alarm event data to the central alarm monitoring system if the certain service parameters of the alarm system and the alarm event data are not met.

5 8. The method of Claim 1, wherein forwarding the routing code to the alarm system comprises forwarding the routing code to the alarm system via the message processing gateway.

9. The method of Claim 1, wherein the alarm event data is communicated to the message processing gateway using a data protocol via a data channel.

10 10. A system for delivery of alarm system event data and connecting a voice channel, comprising:

an alarm system configured to

detect an alarm event, and

15 communicate alarm event data representative of the alarm event;

a message processing gateway configured to

receive the alarm event data from the alarm system,

evaluate service parameters of the alarm system and conditions of the alarm event data, and

20 forward the alarm event data and a voice channel code if certain service parameters of the alarm system and conditions of the alarm event data are met; and  
a private branch telecommunications switch configured to

open a voice channel between the private branch telecommunications switch and a central alarm monitoring station and communicate the alarm event data and the voice channel code to the central alarm monitoring station,

determine whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station, and

forward a routing code to the alarm system in response to a determination that the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open.

11. The system of Claim 10, wherein

the alarm system is further configured to open a voice channel between the alarm system and the private branch telecommunications switch in response to a receipt of the routing code, and

the private branch telecommunications switch is further configured to bridge the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system and the private branch telecommunications switch, to create a voice channel between the alarm system and the central alarm monitoring station.

12. The system of Claim 10, wherein the message processing gateway is further configured to

determine whether an IP address associated with the alarm system or an ID of the alarm system is provisioned at the message processing gateway,

determine whether the alarm system is associated with an active customer account,

determine whether the alarm system is capable and configured for a two-way voice

5 channel, and

determine whether an alarm event associated with the alarm event data requires a voice channel.

13. The system of Claim 12, wherein the message processing gateway is further  
10 configured to forward the alarm event data and the voice channel code to the private branch telecommunications switch when it is determined that the alarm event associated with the alarm event data requires a voice channel.

14. The system of Claim 10, wherein  
15 the alarm system is further configured to communicate an identifier of the alarm system to the message processing gateway, and

the routing code comprises a routing number of the private branch telecommunications exchange and the identifier of the alarm system.

20 15. The system of Claim 14, wherein the private branch telecommunications switch is further configured to bridge the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system and the private branch telecommunications switch based on the identifier of the alarm system.

16. The system of Claim 14, wherein the private branch telecommunications switch is further configured to

determine whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open, after the voice channel between the alarm system and the private branch telecommunications switch is opened by the alarm system in response to a receipt of the routing code, and

indicate that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected, when it is determined that the voice channel between the private branch telecommunications switch and the central alarm monitoring station is disconnected.

17. The system of Claim 10, wherein the message processing gateway is further configured to communicate the alarm event data to the central alarm monitoring system if the certain service parameters of the alarm system and the alarm event data are not met.

18. The system of Claim 10, wherein the private branch telecommunications switch forwards the routing code to the alarm system via the message processing gateway.

19. The system of Claim 10, wherein the alarm system is further configured to communicate the alarm event data to the message processing gateway using a data protocol via a data channel.

20. A method for delivery of alarm system event data and connecting a voice channel, comprising:

receiving alarm event data representative of an alarm event from an alarm system;

5 evaluating, by a computing device, service parameters of the alarm system and conditions of the alarm event data;

opening a voice channel between the computing device and a central alarm monitoring station and communicating the alarm event data and a voice channel code to the central alarm monitoring station if certain service parameters of the alarm system and conditions of the alarm event data are met;

determining, by the computing device, whether the voice channel between the computing device and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station;

generating and forwarding, by the computing device, a routing code to the alarm system in response to a determination that the voice channel between the computing device and the central alarm monitoring station remains open;

opening a voice channel between the alarm system and computing device after forwarding the routing code to the alarm system; and

bridging, by the computing device, the voice channel between the computing device and the central alarm monitoring station and the voice channel between the alarm system and the computing device, to create a voice channel between the alarm system and the central alarm monitoring station.

21. The method of Claim 20, wherein evaluating service parameters of the alarm system and the alarm event data comprises at least one of

determining whether an IP address associated with the alarm system or an ID of the alarm system is provisioned at the computing device;

5 determining whether the alarm system is associated with an active customer account;

determining whether the alarm system is capable and configured for a two-way voice channel; and

determining whether an alarm event associated with the alarm event data requires a voice channel.

10

23. The method of Claim 20, wherein

receiving the alarm event data further comprises receiving an identifier of the alarm system, and

the routing code comprises a routing number of the computing device and the identifier  
15 of the alarm system.

24. The method of Claim 23, wherein bridging the voice channels comprises bridging the voice channels based on the identifier of the alarm system.

20 25. The method of Claim 20, wherein receiving the alarm event data comprises receiving the alarm event data using a data protocol via a data channel.

26. An apparatus for delivery of alarm system event data and connecting a voice channel, comprising:

a message processing gateway configured to

receive alarm event data representative of an alarm event from an alarm system,

5 evaluate service parameters of the alarm system and conditions of the alarm event data, and

forward the alarm event data and a voice channel code if certain service parameters of the alarm system and conditions of the alarm event data are met; and

a private branch telecommunications switch configured to

10 receive the alarm event data and the voice channel code,

open a voice channel between the private branch telecommunications switch and a central alarm monitoring station and communicate the alarm event data and the voice channel code to the central alarm monitoring station,

15 determine whether the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open after communication of the alarm event data and the voice channel code to the central alarm monitoring station,

20 generate and forward a routing code to the alarm system in response to a determination that the voice channel between the private branch telecommunications switch and the central alarm monitoring station remains open,

open a voice channel between the alarm system and the private branch telecommunications switch after forwarding the routing code to the alarm system, and

bridge the voice channel between the private branch telecommunications switch and the central alarm monitoring station and the voice channel between the alarm system and the private branch telecommunications switch, to create a voice channel between the alarm system and the central alarm monitoring station.

5

27. The apparatus of Claim 26, wherein the message processing gateway is further configured to

determine whether an IP address associated with the alarm system or an ID of the alarm system is provisioned at the computing device,

10 determine whether the alarm system is associated with an active customer account,

determine whether the alarm system is capable and configured for a two-way voice channel, and

determine whether an alarm event associated with the alarm event data requires a voice channel.

15

28. The apparatus of Claim 26, wherein

the message processing gateway is further configured to receive an identifier of the alarm system, and

the routing code comprises a routing number of the private branch telecommunications switch and the identifier of the alarm system.

20

29. The apparatus of Claim 28, wherein the private branch telecommunications switch is further configured to bridge the voice channels based on the identifier of the alarm system.

30. The apparatus of Claim 29, wherein the message processing gateway is configured to receive the alarm event data using a data protocol via a data channel.

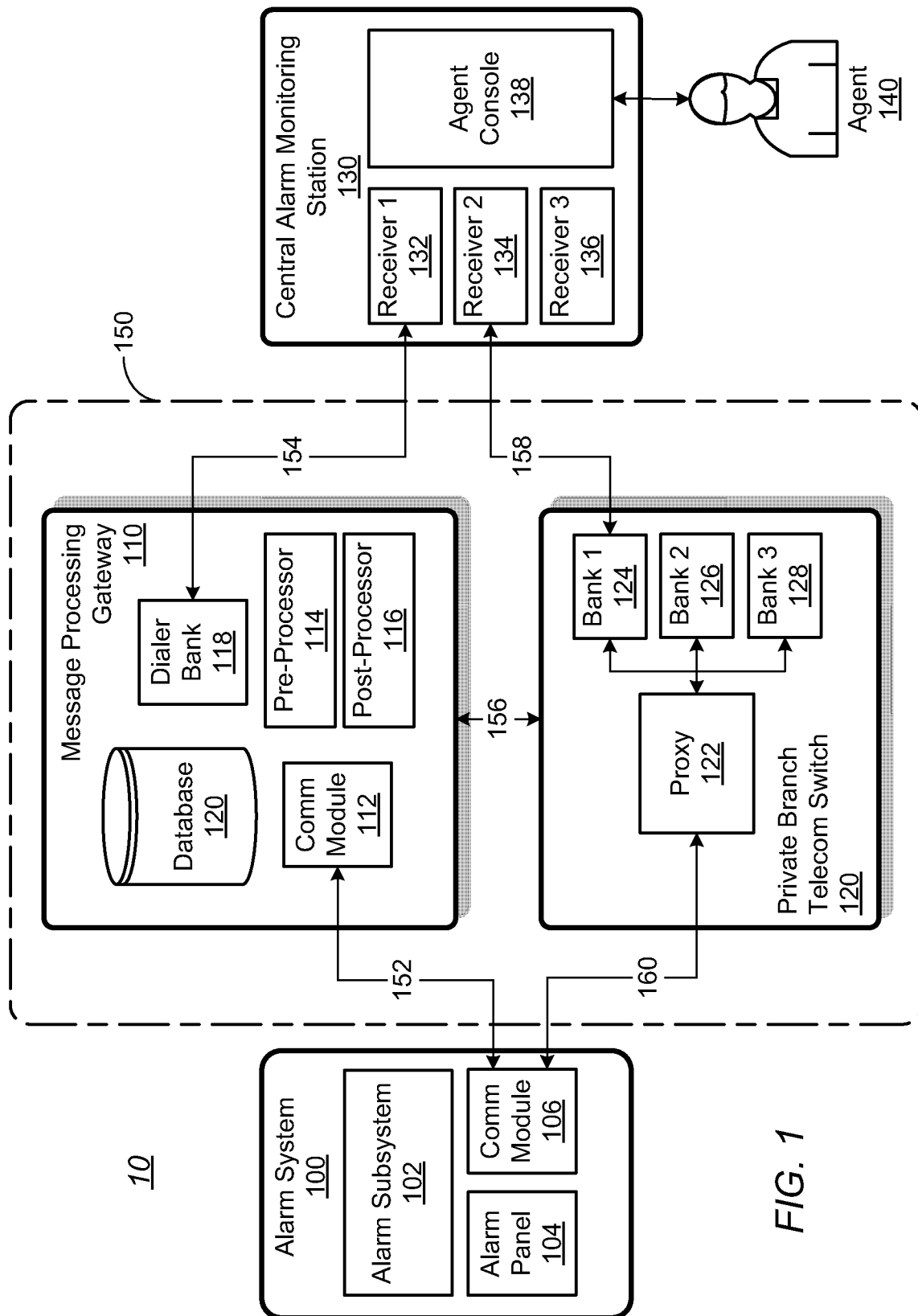


FIG. 1

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FIG. 2

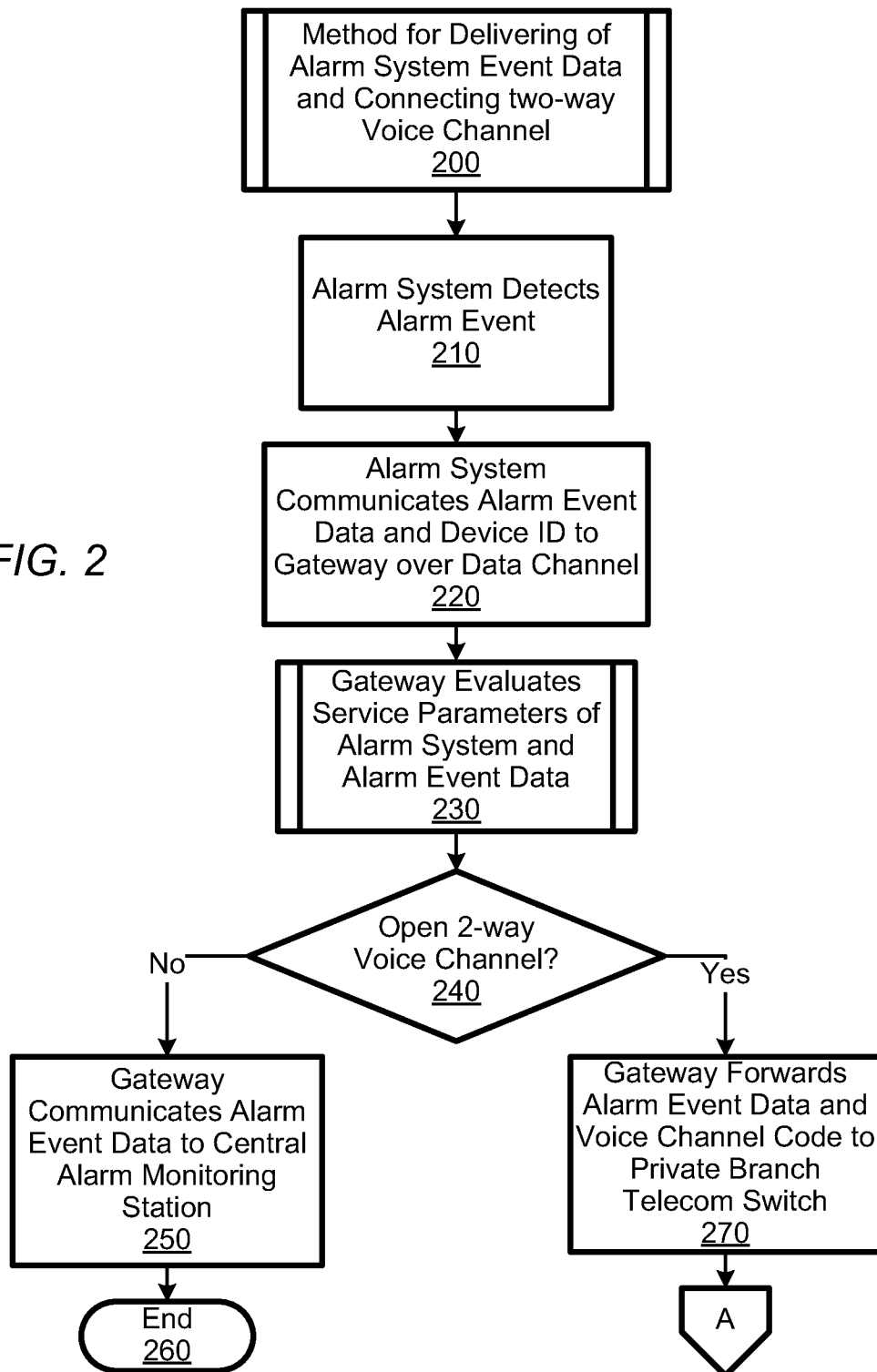
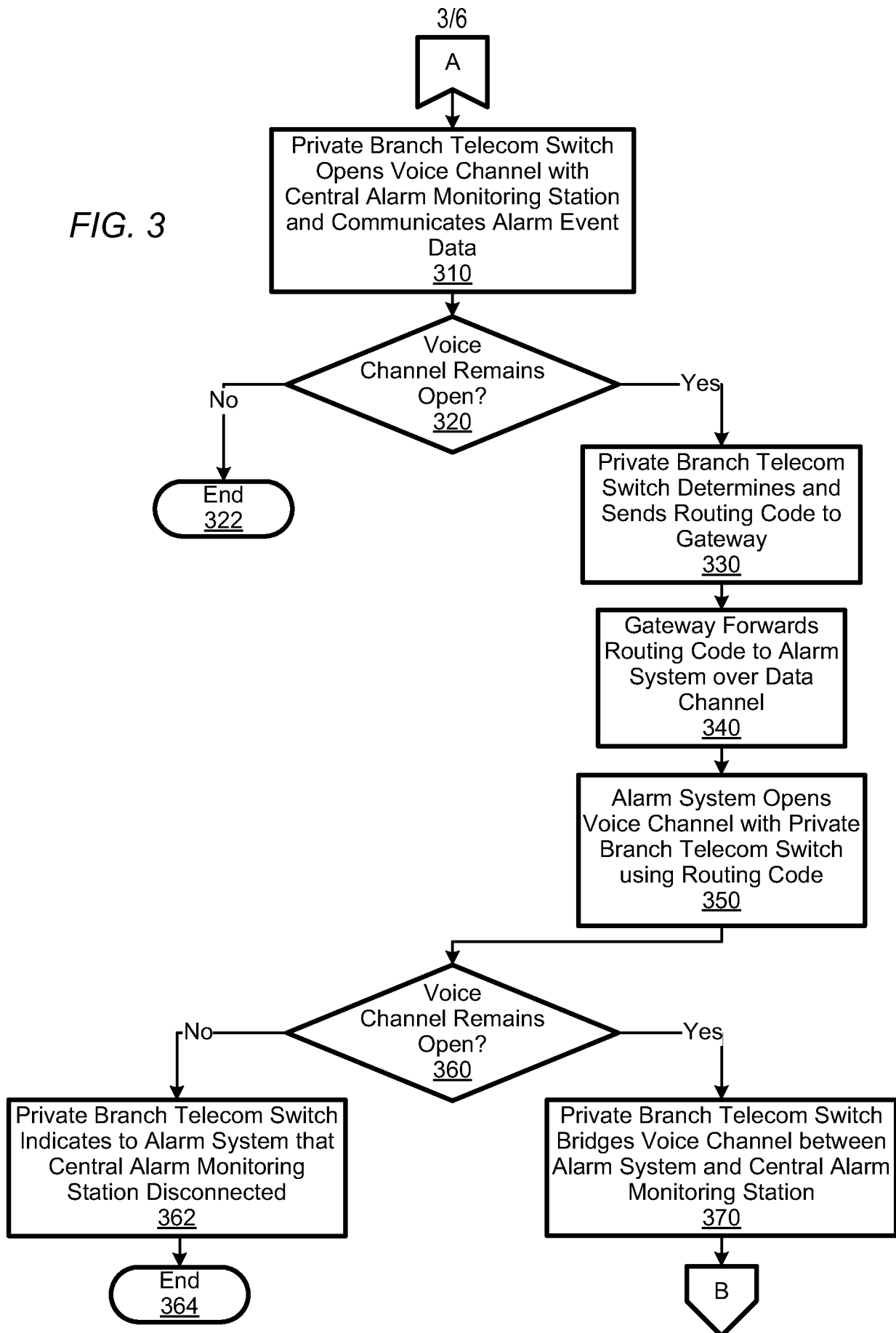


FIG. 3



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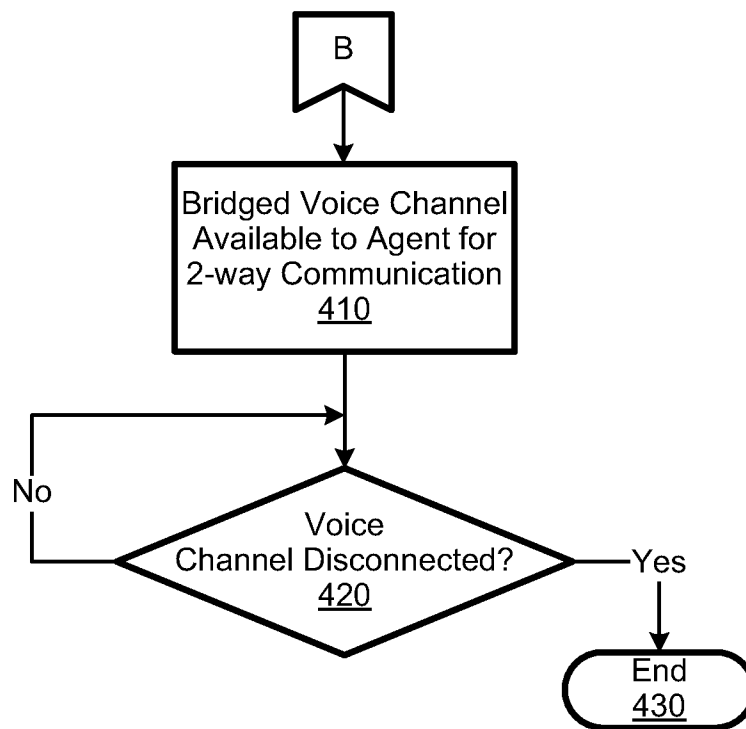
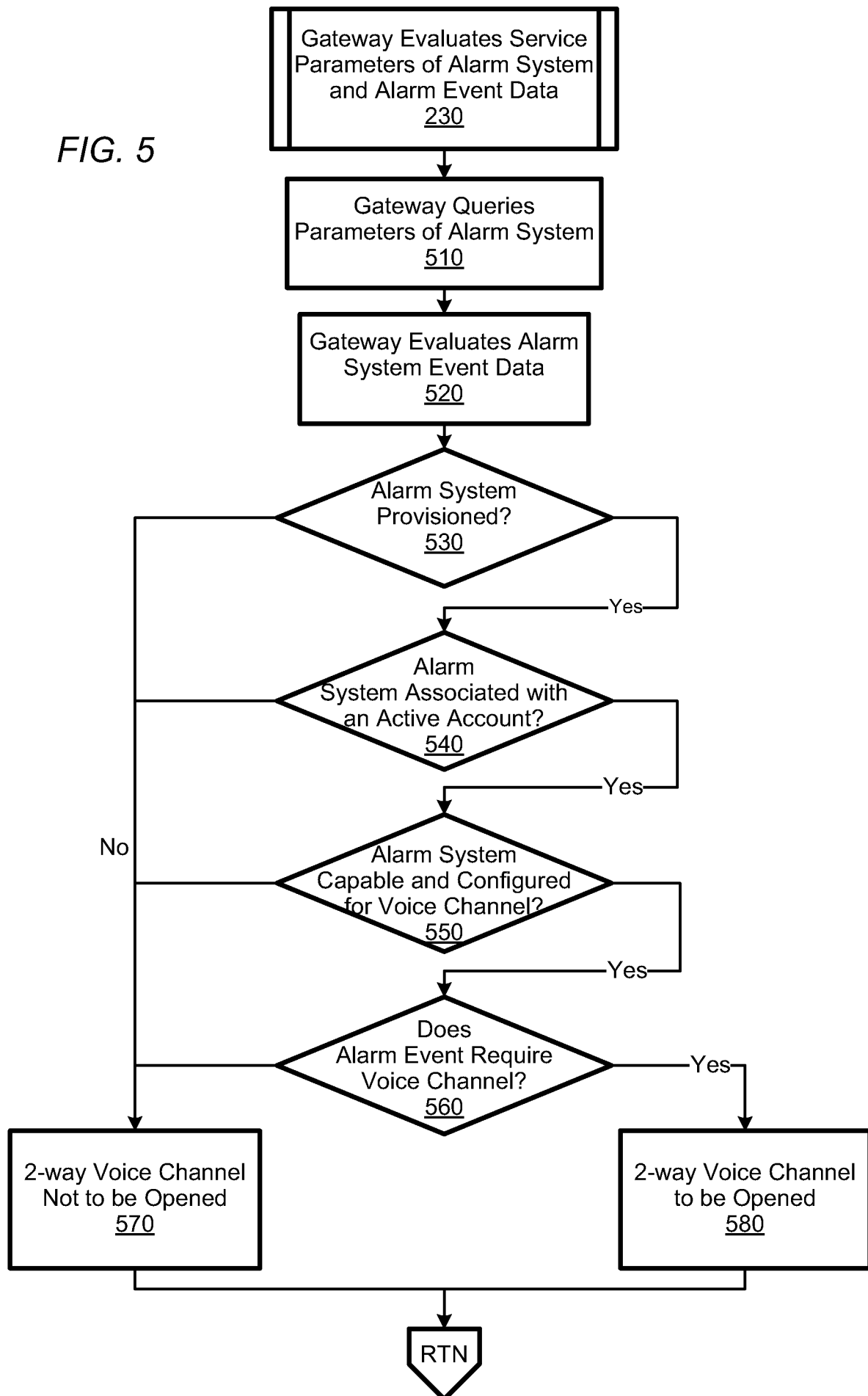


FIG. 4

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FIG. 5



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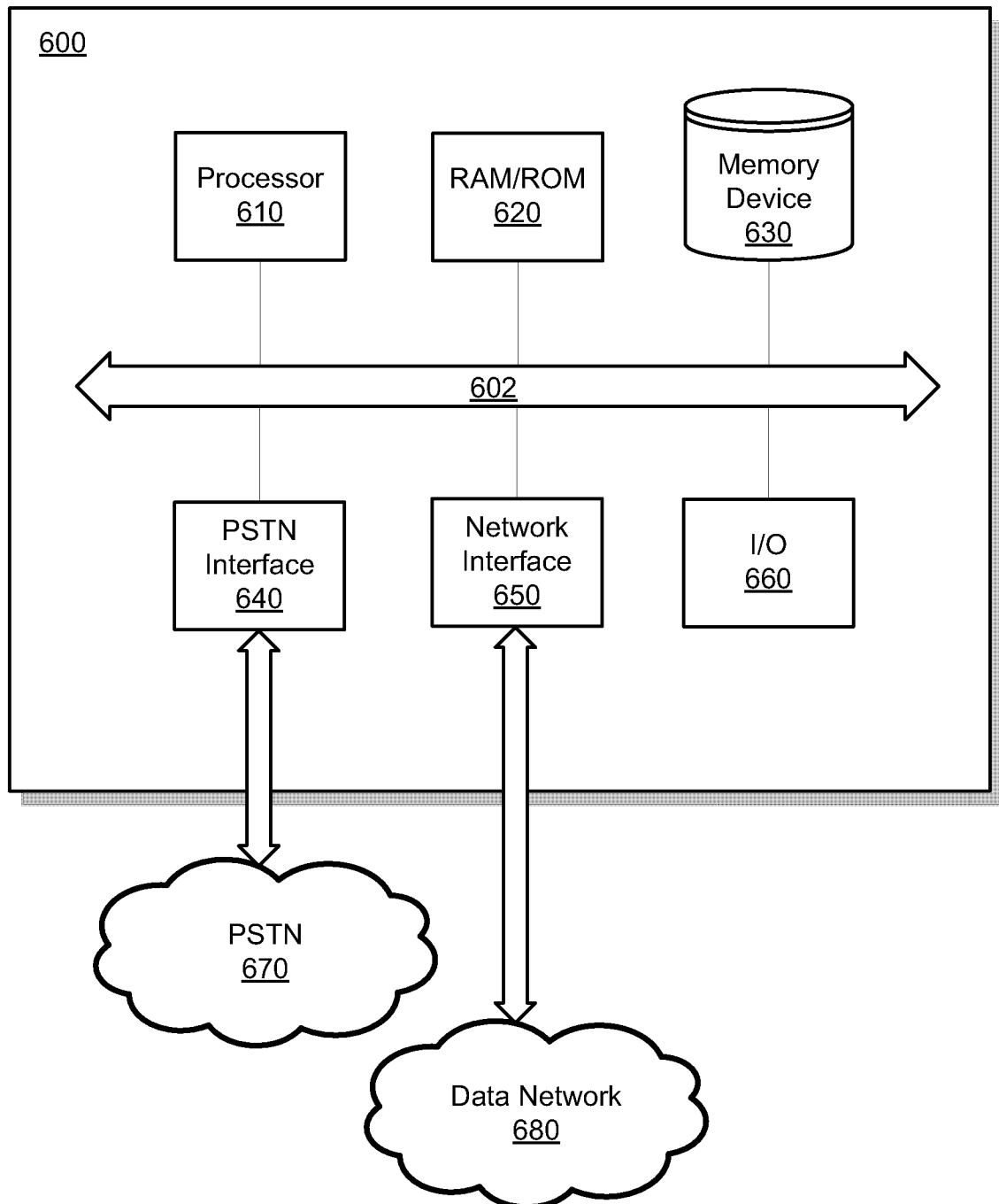


FIG. 6

**A. CLASSIFICATION OF SUBJECT MATTER*****G08B 25/08(2006.01)i***

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)

G08B 25/08; H04Q 1/00; H04M 11/04; G04B 47/00; G05B 23/02; G08B 23/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: "alarm system, voice channel, alarm event, message processing gateway, routing code, service parameter, private branch telecommunications switch"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                               | Relevant to claim No. |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A         | US 2009-0017751 A1 (BLUM WILLIAM R.) 15 January 2009<br>See abstract; figure 4; paragraphs [0023], [0024], [0026].               | 1-30                  |
| A         | US 2005-0099893 A1 (KIMMO JYRINKI) 12 May 2005<br>See abstract; figures 3, 4; paragraphs [0036]-[0040]; claim 1.                 | 1-30                  |
| A         | US 05838223 A (GALLANT; DENNIS et al.) 17 November 1998<br>See abstract; column 3, lines 14-27.                                  | 1-30                  |
| A         | US 2008-0309449 A1 (MARTIN JEAN-PAUL et al.) 18 December 2008<br>See abstract; paragraphs [0127], [0131], [0133], [0135]-[0137]. | 1-30                  |



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

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"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

21 SEPTEMBER 2012 (21.09.2012)

Date of mailing of the international search report

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2012/027881**

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Publication<br>date                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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