Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2775261 C 2016/10/11

(11)(21) 2 775 261

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2012/04/24

(41) Mise à la disp. pub./Open to Public Insp.: 2013/10/24

(45) Date de délivrance/Issue Date: 2016/10/11

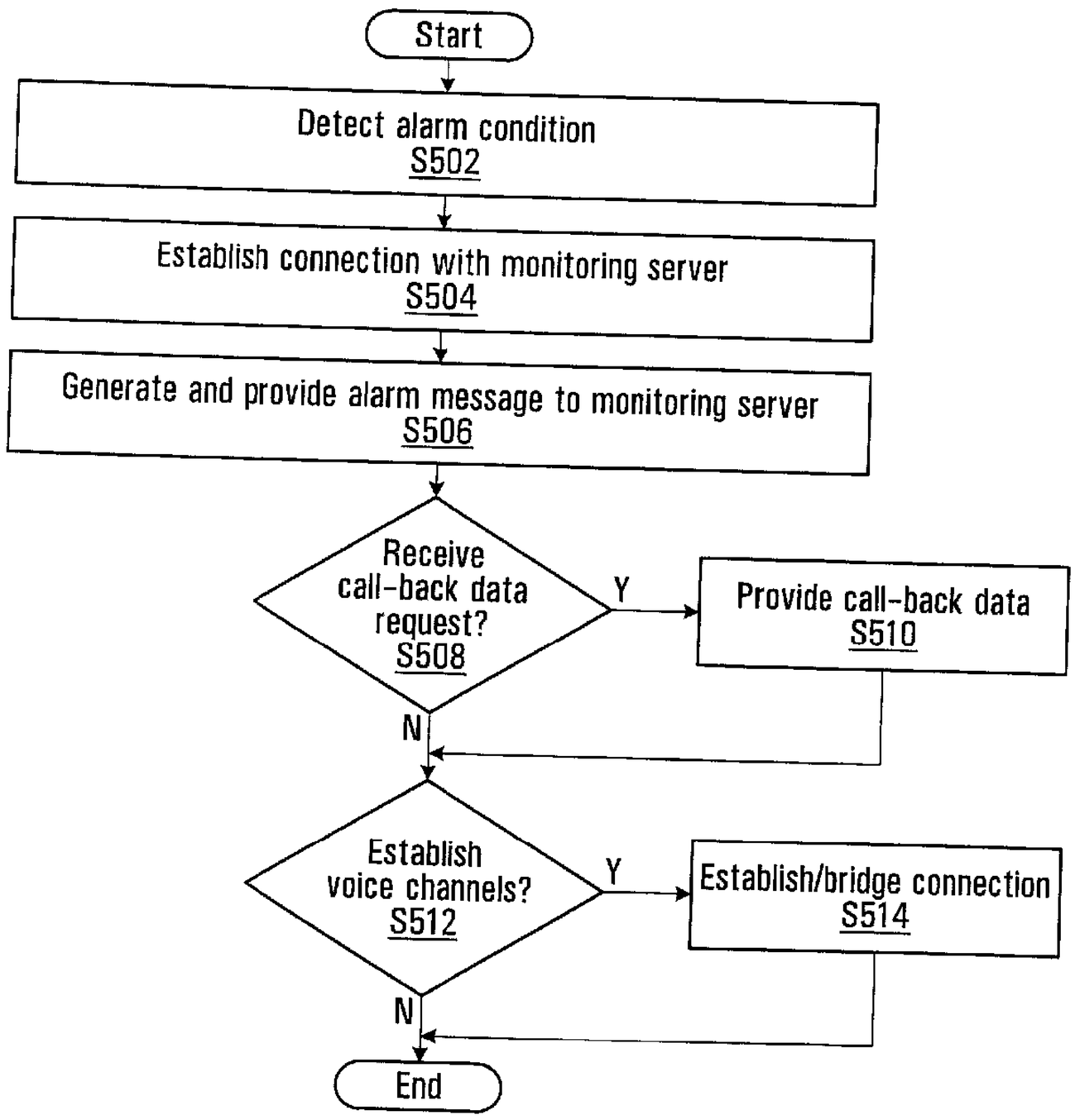
(51) Cl.Int./Int.Cl. *G08B 25/08* (2006.01)

(72) Inventeurs/Inventors:
SMITH, DEREK C., CA;
PATEL, JITENDRA, CA;
EVANS, ROBERT N., CA

(73) Propriétaire/Owner:
TYCO SAFETY PRODUCTS CANADA LTD., CA

(74) Agent: SMART & BIGGAR

(54) Titre : STOCKAGE ET RECUPERATION DE NUMEROS DE RAPPEL POUR SYSTEMES D'ALARME
(54) Title: ALARM SYSTEM CALL-BACK NUMBER PROVISION AND RETRIEVAL



(57) Abrégé/Abstract:
A control panel of an alarm system at a premises stores call-back numbers/addresses and provides these to a monitoring center, as required. In embodiments, the call-back numbers/address may be provided along with the signalling of an alarm condition. In other embodiments, call-back numbers/addresses may be retrieved from the panel at the request of an operator or installer, or periodically. Call-back numbers/address may be stored or updated at the panel by installers or occupants, or automatically.

ABSTRACT OF THE DISCLOSURE

[0076] A control panel of an alarm system at a premises stores call-back numbers/addresses and provides these to a monitoring center, as required. In embodiments, the call-back numbers/address may be provided along with the signalling of an alarm condition. In other embodiments, call-back numbers/addresses may be retrieved from the panel at the request of an operator or installer, or periodically. Call-back numbers/address may be stored or updated at the panel by installers or occupants, or automatically.

ALARM SYSTEM CALL-BACK NUMBER PROVISION AND RETRIEVAL

FIELD OF THE INVENTION

[0001] The present invention relates generally to security systems, and more particularly to systems that provide call-back addresses/numbers in order to notify or contact individuals of an alarm condition.

BACKGROUND

[0002] Business and home premises are commonly equipped with a security system for detecting alarm conditions and reporting these to a monitoring center. One of the primary functions of the monitoring center is to notify a human operator when one or more alarm conditions have been sensed by detectors installed at a monitored premises.

[0003] Detectors may vary from relatively simple hard-wired detectors, such as door or window contacts to more sophisticated battery operated ones, such as motion and glass break detectors. The detectors may each report to an alarm control panel at the premises. The control panel is typically installed in a safe location and is connected to a power supply. The control panel is further in communication with the individual detectors to communicate with or receive signals from individual detectors. The communication between the alarm control panel and the detectors can be one or two way, and may be wired or wireless.

[0004] The control panel, in turn, communicates from the premises to the monitoring center typically using any of a number of communications networks, including the public switched telephone network (PSTN); a cellular telephone or data network; a packet switched network (e.g. the Internet), or the like.

[0005] In response to receiving a message signalling an alarm condition, the monitoring center usually initiates a communication to one or more designated individuals, and/or to appropriate security personnel. The security personnel may be the police or employees of a private security company. The designated individuals may be residents at the premises or their designees.

[0006] Typically (but not always), the communication from the monitoring center to the designated individuals, is by way of telephone call to one or more designated telephone numbers – referred to as call-back numbers. Calls from the monitoring center to designated individuals may notify those individuals of the alarm condition, and confirm that a false alarm has not been signalled.

[0007] Calls to security personnel may dispatch appropriate individuals, such as representatives from the police, fire department or the like, to the premises for follow up.

[0008] Recently, equipping the premises with microphones and speakers to allow the premises communicate with the monitoring center has also become commonplace. Microphones provide audio signals, representing audio sensed at the microphone to the monitoring center, thereby allowing the monitoring center to monitor audio at the premises in case of an alarm condition. The speakers, in turn, allow an operator at the monitoring center to speak with the premises in real-time. Conveniently, an operator at the monitoring center may listen and react to events at a monitored premise, as they occur. For example, the operator at the monitoring center may speak to an occupant or intruder upon being notified of an alarm condition.

[0009] Again, such two way audio communication to the premises may be established by way of a telephone call to a designated call-back number to equipment at the premises.

[0010] As the foregoing illustrates, each alarm system may thus be associated with numerous call-back number that should be contacted, often in a particular order, upon occurrence of an alarm condition. Conventionally, the list of call-back numbers is

established upon installation of the alarm system and stored at the monitoring center for easy access. Changes to the call-back number(s) may be provided by occupants at the premises, as required, for example by placing a call to an administrator of the monitoring center. However, ensuring that the call-back numbers are current, and allowing for their easy update remains a challenge.

[0011] Accordingly, there remains a need for methods and devices that allow for better call-back number provision and retrieval.

SUMMARY

[0012] Exemplary of embodiments of the present disclosure, call-back numbers/addresses may be stored at the control panel of the alarm system at the premises, and provided to the monitoring center as required. In embodiments, the call-back numbers/address may be provided along with the signalling of an alarm condition. In other embodiments, the call-back numbers/addresses may be retrieved from the panel at the request of an operator or installer, or periodically. Call-back numbers/address may be stored or updated at the panel by installers or occupants, or automatically.

[0012a] In an aspect, there is provided a method of maintaining a list of call-back addresses associated with an alarm panel at a user premises, comprising: storing said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel; maintaining a version of said list of call-back addresses at said panel; initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over a packet switched network; updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

[0012b] In another aspect, there is provided a method of operating a monitoring center that receives signals indicative of sensed alarm conditions at a premises from an alarm panel over a packet switched data network, said method comprising: maintaining at said monitoring center a record identifying said alarm panel, said record including a field for storing a call-back address; initiating at said monitoring center retrieval from said panel of a call-back address stored at said panel and retrieving from said panel said call-back address stored at said panel, said call-back address to be contacted in case of an alarm condition at said alarm panel, and signalled from said alarm panel to said monitoring center over said packet switched data network; storing said call-back address as retrieved from said panel at said monitoring center in said field, for later retrieval and call-back of said call-back address in the event of an alarm condition signalled to said monitoring center.

[0012c] In a further aspect, there is provided an alarm system for maintaining a list of call-back addresses associated with an alarm panel at a user premises, said alarm system comprising: a processor; a network interface, for interconnecting said alarm system to a packet switched data network; processor readable memory storing: said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel; and processor executable instructions for maintaining a version of said list of call-back addresses at said panel; initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over the packet switched network; updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

[0012d] In another aspect, there is provided an alarm system for operating a monitoring center that receives signals indicative of sensed alarm conditions at a premises from an alarm panel over a packet switched data network, said alarm system comprising: a network interface, for interconnecting said alarm system to the packet

switched data network; means for storing said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel; means for maintaining a version of said list of call-back addresses at said panel; means for initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over the packet switched network; means for updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

[0012e] In a further aspect, there is provided an alarm system for maintaining a list of call-back addresses associated with an alarm panel at a user premises, said alarm system comprising: a processor; a network interface, for interconnecting said alarm system to a packet switched data network; processor readable memory storing processor executable instructions for maintaining at said monitoring center a record identifying said alarm panel, said record including a field for storing a call-back address; initiating at said monitoring center retrieval from said panel of a call-back address stored at said panel and retrieving from said panel said call-back address stored at said panel, said call-back address to be contacted in case of an alarm condition at said alarm panel, and signalled from said alarm panel to said monitoring center over said packet switched data network; and storing said call-back address as retrieved from said panel at said monitoring center in said field, for later retrieval and call-back of said call-back address in the event of an alarm condition signalled to said monitoring center.

[0012f] In another aspect, there is provided an alarm system for operating a monitoring center that receives signals indicative of sensed alarm conditions at a premises from an alarm panel over a packet switched data network, said alarm system comprising: a network interface, for interconnecting said alarm system to the packet switched data network; means for storing said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm

notification from said panel; means for maintaining a version of said list of call-back addresses at said panel; means for initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over the packet switched network; means for updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

[0013] In another aspect, there is provided a method of operating an alarm panel that signals sensed alarm conditions at a premises to a monitoring center over a packet switched data network, the method comprising: storing at least one call-back address to be contacted in case of an alarm condition at the alarm panel; and providing the a stored call-back address from the alarm panel to the monitoring center over the packet switched network.

[0014] In a further aspect, there is provided an alarm system for signalling sensed alarm conditions at a premises to a monitoring center over a packet switched data network, the panel comprising: a processor; a network interface, for interconnecting the alarm system to the packet switched data network; processor readable memory storing: at least one call-back address to be contacted in case of an alarm condition at the alarm panel; and software to provide the stored call-back address from the alarm panel to the monitoring center over the packet switched network.

[0015] In another aspect, there is provided an alarm system for signalling sensed alarm conditions at a premises to a monitoring center over a packet switched data network, the panel comprising: a network interface, for interconnecting the alarm system to the packet switched data network; means for storing at least one call-back address to be contacted in case of an alarm condition at the alarm panel; and means for providing the stored call-back address from the alarm panel to the monitoring center over the packet switched network.

[0016] Other aspects and features of the present invention will become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In the figures which illustrate by way of example only, embodiments of the present invention,

[0018] **FIG. 1** is a schematic diagram of an alarm system, exemplary of an embodiment of the present invention;

[0019] **FIG. 2** is a schematic block diagram of a panel in the alarm system of FIG. 1, exemplary of an embodiment of the present invention;

[0020] **FIG. 3** is a schematic block diagram of a monitoring center in the alarm system of **FIG. 1**;

[0021] **FIG. 4** is a schema of a database table stored at the monitoring center of **FIG. 3**; and

[0022] **FIGS. 5** and **6** are flow diagrams depicting steps performed at the alarm

panel and central monitoring center of **FIG. 1**, respectively, exemplary of embodiments of the present invention.

DETAILED DESCRIPTION

[0023] **FIG. 1** depicts an exemplary security system infrastructure **20** of security systems including multiple alarm panels **22a, 22b, 22c** (individually and collectively panel **22**) at customer premises **28a**, **28b**, **28c** (individually and collectively premises **28**), respectively, communicating through a data network **24** such as the Internet, with a central monitoring center **26**. Only three premises **28** are illustrated for clarity. Additionally, panels **22** may communicate with monitoring center **26** through additional communication networks – like cellular network **18**, and the PSTN **16**.

[0024] As will be appreciated, data network **24** may be any combination of wired and wireless links capable of carrying packet switched traffic, and may span multiple carriers, and a wide geography. In one embodiment, data network **24** may simply be the public Internet. Further access points, such as routers, DSL modems, wireless radios, and the like possibly interconnecting panels **22** with data network **24** are not illustrated.

[0025] At residential or business premises **28**, each alarm panel **22** may be interconnected with one or more detectors **30**. Each of detectors **30** provides information regarding the status of the monitored premises to a local alarm panel **22**. Detectors **30** may include, for example, motion detectors, glass break detectors, and contact switches. Detectors **30** may be hard wired to alarm panel **22** or may communicate with alarm panel **22** wirelessly, in manners known to persons of ordinary skill in the art. Alarm panel **22** may further include other interfaces such as key pads, sirens, and the like, not specifically shown in **FIG. 1**.

[0026] One particular detector **36**, forming part of system infrastructure **20**, is an audio input transducer that acts as a microphone, and allows audio at premises **28** to be sensed. Electrical signals corresponding to the sensed audio are provided to panel **22**. The electrical signals may be analog or digital signals that may be compressed,

either proximate audio detector **36** or at panel **22**. In the event the signals are digital, they may be encoded at the audio detector **36**.

[0027] Additionally, an alarm system at a premise **28** further includes another audio transducer that acts as a loud speaker (hereinafter speaker **34**) to reproduce audio from panel **22**. Although the term speaker is used to describer the transducer, it will be appreciated that speaker **34** may take the form of a piezo-electric or similar element, acting a speaker. Electrical signals corresponding to the audio are provided by panel **22**. The electrical signals may again be analog or digital signals that may be compressed.

[0028] Links between panel **22** and audio detector **36** and speaker **34** may be wired or wireless.

[0029] As illustrated in **FIG. 2**, a typical alarm panel **22** includes a processor **60**; memory **62** in communication with processor **60**; a detector interface **66** for communication with detectors **30/36**; and speaker **34**; and a data network interface **64** for communication with data network **24**. Panel **22** may further include a telephony interface **68** to allow incoming telephone (or cellular network) calls to be originated or received at panel **22**, as further described below. Telephony interface **68** may be a PSTN interface, or alternatively an interface to communicate with celluar network **18**. If telephony interface 68 interfaces with cellular network **18**, telephony interface **68** may take the form of a GSM/UMTS, 3G, LTE, or similar cellular network interface capable of directing voice and/or data over cellular network **18**. As well, telephony interface **68** may be capable of receiving incoming calls over network **18**.

[0030] Memory **62** stores program instructions and data used by processor **60** of alarm panel **22**. Memory **62** may be a suitable combination of random access memory and read-only memory, and may host a suitable firmware, operating software, and may be organized as a file system or otherwise.

[0031] Example alarm panels may comprise DSC® model SCW9155 suitably modified to operate as described herein.

[0032] As will become apparent, panel **22** under software control may be capable of separately establishing communication path to signals alarm conditions to monitoring center **26**. Optionally, panel **22** may be able to exchange audio between monitoring center **26** and panel **22**, in real-time. In the depicted embodiment data network **24** may be used to signal the alarm condition. The audio paths to and from the monitoring channel may be established over a cellular telephone network **18**, or over the PSTN **16**. A skilled person will readily recognize that the communications paths could be transported over the same network - such as the PSTN, a wireless network, the internet or the like.

[0033] Panel **22** may further optionally establish a data path to monitoring center **26** for the provision of configuration data, as further described below.

[0034] To this end, program instructions stored in memory **62** of panel **22** may additionally store software components allowing network communications and establishment of connections across data network **24**. The software components may, for example, include an internet protocol (IP) stack, and a session initiation protocol (SIP) client, and a suitable voice over IP (VoIP) client. Of course, other software components suitable for establishing a connection and communicating across network **24** will be apparent to those of ordinary skill.

[0035] Program instructions stored in memory **62** of alarm panel **22**, along with configuration data may control overall operation of panel **22**. In particular, one or more data network addresses may be stored in memory of alarm panel **22**. These network addresses may include the IP network addresses by which monitoring center **26** may be reached. Alarm panel **22** may send data associated with sensed alarm conditions sensed at premises **28** to central monitoring center **26**.

[0036] As part of the configuration data, panel **22** may further store one or more call-back addresses that may be used by monitoring center **26** in response to receiving notification of an alarm condition, as detailed below. Configuration data, including stored call-back addresses may be programmed by an administrator or installer at panel **22**, using a suitable interface, such as a keyboard and display, or by way of an

external computing device.

[0037] Panel **22** may further include a voice codec **70** in communication with audio detector **36** and speaker **34** to encode voice detected at detector **36**, and to decode voice data received from monitoring center **26**. Voice codec **70** may, for example, be a voice coder encoder (and decoder), compliant with ITU Recommendation G.711, G.723, G.729, or any other known voice coding algorithm or standard. Voice codec **70** may be a hardware component separate from the processor of panel **22**, and is illustrated as such in **FIG. 2**, or may be formed in software, stored for example in memory **62** for execution by the processor of panel **22**.

[0038] Monitoring center **26** is more particularly illustrated in **FIG. 3**. Monitoring center **26** is depicted as a single monitoring center in **FIG. 1**; however, it could alternatively be formed of multiple monitoring centers, each at a different physical location, and each in communication with data network **24**. In particular, in order to process a high volume of alarm conditions from a large number of subscribers, monitoring center **26** includes a plurality of monitoring servers **32**. Each monitoring server **32** processes alarm messages from a subset of panels **22** of subscribers serviced by monitoring center **26**. Additionally, a monitoring server **32** may take part in two-way audio communication over network **24**, with an interconnected panel **22**.

[0039] Each monitoring server **32** may include a processor **38**, network interface **48** and memory **42**. Monitoring servers **32** may physically take the form of rack mounted cards. Monitoring servers **32** may be in communication with one or more operator terminals **50**. An example monitoring server **32** may comprise a SUR-GARD^{TM} GS2055 or TL2055GS communicator, available from DSC, modified to function as described herein.

[0040] Processor **38** of each monitoring server **32** acts as a controller for each monitoring server **32**, and is in communication with, and controls overall operation, of each monitoring server **32**. Processor **38** may include, or be in communication with memory **42** controlling the overall operation of monitoring server **32**. Suitable software enabling each monitoring server **32** to process alarm messages, establish voice

connections and encode/decode voice data may be stored within memory **42** of each monitoring server **32**. Software may include a suitable internet protocol (IP) stack and applications/clients.

[0041] Each monitoring server **32** of central monitoring center **26** may be associated with an IP address and port(s) by which it can be contacted by alarm panels **22** (**FIG. 1**) to report alarm events over data network **24**, and establish other IP connections. In the depicted embodiment, monitoring server **32a** is associated with IP address 216.0.0.1; monitoring server **32b** is associated with IP address 216.0.0.2. These addresses may be static, and thus always identify a particular one of monitoring servers **32** on network **24**. Alternatively, dynamic addresses could be used, and associated with static domain names, resolved through a domain name service.

[0042] As well, in the depicted embodiment, monitoring servers **32** are interconnected on a local area network. A suitable router (not shown) may route data between servers **32** and to a respective server at their associated IP addresses.

[0043] Network interface **34** may be a conventional network interface that interfaces with communications network **24** (**FIG. 1**) to receive incoming signals, and may for example take the form of an Ethernet network interface card (NIC). Terminal(s) **50** may be computers, thin-clients, or the like, to which received data representative of an alarm event is passed for handling by human operators. Each terminal **50** may include a monitor, and a microphone **52**, and an audio transducer/speaker **54** to allow audio to be captured and reproduced at terminal **50**. Terminal **50** may include suitable terminal emulation software and thin-client software to allow audio to be streamed to/from speaker **54** and microphone **52**.

[0044] An operator at terminal **50** may further be able to establish outgoing telephone calls, to the premises, the police, or third party security personnel. To that end, terminal **50** may be proximate a PSTN telephone, or may include or have access to voice-over-IP software (running at server **32**, or elsewhere) allowing establishment of a telephone call or equivalent to a destination telephone number.

[0045] As will be appreciated, in the depicted embodiment example terminals **50** are connected to servers **32** by network. They could similarly be attached by conventional video and audio cables. If they are network attached, they do not need to be geographically proximate servers **32**, but may be geographically remote and need only form part of monitoring center **26,** virtually.

[0046] Optionally, applications executed at each terminal **50** may be provided by an application server **40**, capable of providing these applications as Java applets, or other executable applications to terminals **50**.

[0047] Monitoring center **26** may further include subscriber database **44** that includes a database under control of a database engine. Database **44** may contain entries corresponding to the various subscribers serviced by monitoring center **26**. Database **44** may, for example, include the names and addresses, phone number, contact phone number, for each subscriber at premises **28** (**FIG. 1**). As well, database **44** may include the particulars of each detector **30**, the identifier of each panel **22** assigned to a particular subscriber; account information; and the like. Database **44** may further log or archive alarm data received from panels **22**, including audio data generated in connection with such alarm events, as further described below.

[0048] Monitoring center **26** receives and processes incoming messages from panels **22**. Extracted data from the incoming messages may, for example, be overhead, or alarm data. The alarm data may be passed to processor **30**, which, in turn, may make decisions under software control based upon that data. In particular, processor **38** may be programmed to initiate certain alarm handling procedures based on the received data.

[0049] For example, alarm data extracted from one or more incoming alarm data signals may specify that a particular detector **30** at a particular monitored premise **28** was tripped. Processor **38** may be programmed to notify a human operator at a terminal **50** using the alarm data, for further action. Further action may include the human operator consulting, and calling, one of a list of phone numbers associated with that particular monitored premise, stored in database **44**. Database **44** may, for

example, include the telephone number(s) of the homeowner and occupants, and the operator may call the homeowner to determine what the problem was/is.

[0050] In particular, database **44** may include a table **80** of call-back addresses for each panel serviced by monitoring center **26**, as more particularly illustrated in **FIG. 4**. Table **80** may be linked to one or more other tables (for example through a panel identifier (PANEL_ID) field) for a particular alarm system. These other tables (not specifically illustrated) would uniquely identify the alarm system, and include further information such as the address of the premises, the name(s) of the occupants, the detectors at the premises, and the like.

[0051] In any event, as illustrated in **FIG. 4**, table **80** of call-back addresses may identify numbers/addresses to be contacted by monitoring center **26** in case of an alarm condition signalled to monitoring center **26**, and the order in which the call-back numbers are to be contacted. Example table **80** may include several call-back addresses (CALL_BACK_ADDRESS_1, CALL_BACK_ADDRESS_2 ... CALL_BACK_ADDRESS_n) in the form of telephone numbers or IP addresses, associated with each panel **22**. The depicted call-back addresses may represent call-back addresses for two way communications to the premises; intruder conditions; and fire conditions. The condition for each call-back address may further be identified in table **80** (CONDITION).

[0052] As well, a numerical priority of each call-back address may also stored in the PRIORITY field. An operator at server **32** may contact the highest priority call-back address first. If that contact cannot be established at that call-back address, a lower priority call-back number may be contacted. Call-back addresses for the same condition, having equal priority may be contacted concurrently. The call-back address for two way communications to premises **28** may be treated like any other call-back address. Additionally, table **80** may further include a text descriptor of each call-back number.

[0053] Further, memory **62** of panel **22** may store data corresponding to the contents of table **80**, as part of its configuration data. That is, call-back addresses may

be stored at panel **22**. As noted, memory **62** may be updated at panel **22** by an administrator (e.g. occupant at premises **28**), or an installer, through a keyboard or other interface at panel **22**, using a suitable user interface provided by panel **22**.

[0054] Optionally, one or more of call-back addresses at panel **22** may be updated automatically. For example, if panel **22** includes a cellular network interface (for example, as telephony interface **68**), the cellular network interface may provide the cellular network telephone number assigned to the interface may be provided by the interface to processor **60**, and then stored in memory **62**. The telephone number may be provided after a cellular network connection to the interface is established, or after the interface is initialized.

[0055] Exemplary of embodiments of the present invention, table **80** at monitoring server **32** may be updated with the corresponding contents of memory **62**.

[0056] Monitoring center **26** may dispatch an update request over network **24** to the IP address of panel **22**. The IP address of panel **22** may be static or dynamically assigned. If the IP address of panel **22** is assigned dynamically, panel **22** may be provided to monitoring center **26** by panel **22**. In response to the update request, panel **22** under software control may provide one or more datagrams including data in memory **62** that may be used to update table **80** for that panel **22**. Monitoring center **26**, under control of processor **38**, in turn, may use the received data to update table **80** for that panel **22**. In an embodiment, central monitoring center **26** may periodically query each panel **22**. For example, monitoring center **26** may query each panel monthly, bi-monthly, quarterly, or other suitable intervals under software control. Desired intervals may be programmed by an operator at terminal **50**.

[0057] Alternatively, monitoring center **26** may query a particular panel **22** in response to operator instructions entered, for example, at terminal **50, to** retrieve call-back addresses. The operator instructions may, for example, be dispatched by an operator at monitoring center **26** to initiate retrieval of call-back numbers and associated data from panel **22** over network **24**, while or after the operator is servicing a signalled alarm condition from panel **22**.

[0058] Alternatively, the content of memory **62** may be used by panel **22** to automatically provide call-back addresses upon notification of an alarm condition to monitoring center **26**, as detailed below.

[0059] Now, in the presence of an alarm condition, alarm messages are dispatched and handled as depicted in **FIGS. 5** and **6**. Specifically, upon detection of an alarm condition at a detector **30** at premises **28** in block **S502**, panel **22** under software control generates an alarm message and dispatches it to the assigned monitoring server **32** for that panel **22** in block **S506** using network **24**, and the network address (e.g. IP address) of server **32** assigned to that panel. As part of the dispatch of the message, alarm panel **22** may establish a TCP/IP socket (and thus a connection over network **24**) to the monitoring server **32** in block **S504**. Each alarm message generated/dispatched in block **S506** includes at least an identifier of panel **22** originating the message and the sensed condition giving rise to the alarm condition.

[0060] Monitoring server **32**, upon receipt of the alarm message in block **S602** may more particularly identify the panel **22** and associated premises **28** using, for example, database **44**, and generate a message or communication for down stream handling, to eventually dispatch personnel to the monitored premises as required. The message or an indicator thereof may, for example, be dispatched to an operator at one of terminals **50**, for further handling.

[0061] As part of this dispatch, the record within database **44** associated with the signalling panel **22** may be retrieved in block **S604**. Data therefrom may be presented to the operator at terminal **50**. In particular, the operator may be presented with call-back addresses associated with panel **22**, and associated with the signalled alarm condition. Optionally, only those call-back addresses associated with the particular signalled alarm condition may be presented at terminal **50**. This would simplify operation at terminal **50**, as an operator would not need to determine the correct call-back address(es) for a signalled condition.

[0062] Optionally, in block **S606**, monitoring server **32** may dispatch a call-back address query message to panel **22** to update table **80** for that panel. The query

message may be a packet based message, known and understood by both panel **22** and server **32**. In response, panel **22** may provide the contents of memory **62** identifying call-back numbers, and associated data used to populate table **80** at monitoring server **32** in blocks **S508** and **S510**. The call-back address data may be received at monitoring server **32** in block **S608**. Monitoring server **32**, in turn, may update table **80** of database **44** using the received data in block **S610**.

[0063] Next, an operator at monitoring center **26** may be presented with a user interface at terminal **50** to allow the operator to see status information about a signalled alarm – including the address of the premises, the name of the occupant(s), call-back numbers, etc. in block **S612**. The user interface may be generated by software at terminal **50**, or by or in conjunction with software at server **32**, using data from database **44**. For example, a user interface may be provided as an HTML page using HTML code stored at server **32** and presented by a browser hosted at terminal **50**. The user interface at terminal **50** could be presented using terminal emulation or custom software at terminal **50**, or in any other way apparent to those of ordinary skill.

[0064] If one or more call-back addresses are identified, these may be presented to the operator at terminal **50**, who may initiate call-back to the identified addresses.

[0065] As will be appreciated, call-backs may also be partially or wholly automated at monitoring center **26**. For example, if the call-back numbers identify a call-back address for two-way communication, monitoring center **26** may automatically attempt to establish voice channels with panel **22** in block **S512-S514** and **S614**.

[0066] In particular, two-way voice channels may be established by monitoring server **32** placing a call to a suitable call-back address stored in table **80**, allowing individuals audible at audio detector **36** in communication with panels **22** to communicate with a monitoring server **32**, through speakers **54** and/or microphones **52** at terminals **50** to allow operators at terminals **50** to communicate with premises **28**, in real time.

[0067] The two-way voice channel(s) may be a conventional PSTN or cellular call

to panel **22**. Alternatively, the two-way voice channels may be be voice-over-IP connections, established to panel **22**, for example using the H.323, MGCP, SIP and/or other suitable protocol(s), using appropriate clients hosted at panel **22** and monitoring center **26**.

[0068] Once established, the voice connections may be routed to an operator at monitoring server **32**, for example at a terminal **50**. This may, for example, be done by serializing the voice data received by the software at server **32** from panel **22**, and providing the streamed data to terminal **50**, by way of thin client software at terminal **50**.

[0069] In blocks **S512** and **S614**, the connection to server **32** may be connected/bridged to a terminal **50** proximate an available operator. The operator at terminal **50** may listen to audio at premises **28** and speak to premises **28**. Audio at premises **28** may be picked up by speaker **34**, converted to data by codec **70** and provided to monitoring center **32** over network **24**, or directly over PSTN **16** for decoding at monitoring server **32** and playback at a speaker **54**.

[0070] Likewise audio spoken into microphone **52** may be encoded by codec **46** at monitoring server **32** or by thin client software at terminal **50**. Corresponding data may be provided to panel **22** over PSTN **16** or network **24**. At panel **22**, the audio data from server **32** may be decoded using codec **70**, if required. Decoded audio may be provided to speaker **34** allowing real-time, two-way, audio communication between monitoring center **26** and panel **22**.

[0071] Additionally, further call-back numbers identified in table **80** and associated with the signalled alarm condition may be presented to an operator at terminal **50**. The operator may in turn, call the call-back numbers in accordance with the priority identified in table **80**.

[0072] If the operator is unsuccessful in reaching individuals at the provided call-back addresses, the operator may optionally initiate a transfer of call-back data from memory **62** of panel **22**, as described above.

[0073] In alternate embodiments, any call-back numbers associated with a particular signalled alarm condition could be provided concurrently with the alarm message signalling the alarm condition, or as part of the message.

[0074] Conveniently, in the above described embodiments, call-back addresses can be maintained at the premises by those most familiar with these addresses, or upon initial set-up by an installer, or automatically. As the call-back addresses change, they may be updated at the premises, possibly without contacting a service provider.

[0075] Of course, the above described embodiments are intended to be illustrative only and in no way limiting. The described embodiments of carrying out the invention are susceptible to many modifications of form, arrangement of parts, details and order of operation. The invention, rather, is intended to encompass all such modification.

WHAT IS CLAIMED IS:

1. A method of maintaining a list of call-back addresses associated with an alarm panel at a user premises, comprising:

storing said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel;

maintaining a version of said list of call-back addresses at said panel;

initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over a packet switched network;

updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

2. The method of claim 1, wherein said list of call-back addresses is retrieved from said panel automatically at scheduled intervals.

3. The method of claim 1, wherein said list of call-back addresses comprises a cellular telephone number.

4. The method of claim 1, wherein said list of call-back addresses comprises a PSTN telephone number, or an internet address.

5. A method of operating a monitoring center that receives signals indicative of sensed alarm conditions at a premises from an alarm panel over a packet switched data network, said method comprising:

maintaining at said monitoring center a record identifying said alarm panel, said record including a field for storing a call-back address;

initiating at said monitoring center retrieval from said panel of a call-back address stored at said panel and retrieving from said panel said call-back address stored at said panel, said call-back address to be contacted in case of an alarm condition at said alarm panel, and signalled from said alarm panel to said monitoring center over said packet switched data network;

storing said call-back address as retrieved from said panel at said monitoring center in said field, for later retrieval and call-back of said call-back address in the event of an alarm condition signalled to said monitoring center.

6. The method of claim 5, wherein said call-back address comprises a cellular telephone number, stored automatically at said panel after said panel connects to a cellular network.

7. The method of claim 5, further comprising retrieving said call-back address from said record and placing a telephone call to said call-back address, said telephone call for two-way communication between said panel and said monitoring center, in response to having received a reported alarm condition.

8. The method of claim 7, wherein said telephone call is a voice over internet protocol (VoIP) call.

9. The method of claim 5, wherein said call-back address comprises a PSTN telephone number, or an internet address.

10. The method of claim 5, wherein said record includes at least one field for storing multiple call-back addresses, and wherein said method further comprises storing said multiple call-back addresses at said panel, and providing said multiple stored call-back addresses from said alarm panel to said monitoring center over said packet switched network.

11. The method of claim 5, further comprising contacting said multiple call-back addresses from said monitoring center in a defined order in response to an alarm condition.

12. An alarm system for maintaining a list of call-back addresses associated with an alarm panel at a user premises, said alarm system comprising:

a processor;

a network interface, for interconnecting said alarm system to a packet switched data network;

processor readable memory storing:

said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel; and

processor executable instructions for

maintaining a version of said list of call-back addresses at said panel;

initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over the packet switched network;

updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

13. The alarm system of claim 12, wherein said list of call-back addresses is retrieved from said panel automatically at scheduled intervals.

14. The alarm system of claim 12, wherein said list of call-back addresses comprises a cellular telephone number.

15. The alarm system of claim 12, wherein said list of call-back addresses comprises a PSTN telephone number, or an internet address.

16. The alarm system of any one of claims 12 to 15, wherein said processor readable memory further stores processor executable instructions to establish two-way communication between said panel and said monitoring center.

17. The alarm system of any one of claims 12 to 16, wherein said processor executable instructions comprise instructions for providing a stored call-back address in response to sensing an alarm at the user premises.

18. An alarm system for operating a monitoring center that receives signals indicative of sensed alarm conditions at a premises from an alarm panel over a packet switched data network, said alarm system comprising:

a network interface, for interconnecting said alarm system to the packet switched data network;

means for storing said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel;

means for maintaining a version of said list of call-back addresses at said panel;

means for initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over the packet switched network;

means for updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

19. The alarm system of claim 18, wherein said list of call-back addresses is retrieved from said panel automatically at scheduled intervals.

20. The alarm system of claim 18, wherein said list of call-back addresses comprises a cellular telephone number.

21. The alarm system of claim 18, wherein said list of call-back addresses comprises a PSTN telephone number, or an internet address.

22. An alarm system for maintaining a list of call-back addresses associated with an alarm panel at a user premises, said alarm system comprising:

a processor;

a network interface, for interconnecting said alarm system to a packet switched data network;

processor readable memory storing processor executable instructions for

maintaining at said monitoring center a record identifying said alarm panel, said record including a field for storing a call-back address;

initiating at said monitoring center retrieval from said panel of a call-back address stored at said panel and retrieving from said panel said call-back address stored at said panel, said call-back address to be contacted in case of an alarm condition at said alarm panel, and signalled from said alarm panel to said monitoring center over said packet switched data network; and

storing said call-back address as retrieved from said panel at said monitoring center in said field, for later retrieval and call-back of said call-back address in the event of an alarm condition signalled to said monitoring center.

23. The alarm system of claim 22, wherein said call-back address comprises a cellular telephone number, stored automatically at said panel after said panel connects to a cellular network.

24. The alarm system of claim 22, wherein said processor executable instructions comprise instructions for retrieving said call-back address from said record and placing a telephone call to said call-back address, said telephone call for two-way communication between said panel and said monitoring center, in response to having received a reported alarm condition.

25. The alarm system of claim 24, wherein said telephone call is a voice over internet protocol (VoIP) call.

26. The alarm system of claim 22, wherein said call-back address comprises a PSTN telephone number, or an internet address.

27. The alarm system of claim 22, wherein said record includes at least one field for storing multiple call-back addresses, and wherein said method further comprises storing said multiple call-back addresses at said panel, and providing said multiple stored call-back addresses from said alarm panel to said monitoring center over said packet switched network.

28. The alarm system of claim 22, wherein said processor executable instructions comprise instructions for contacting said multiple call-back addresses from said monitoring center in a defined order in response to an alarm condition.

29. The alarm system of any one of claims 22 to 28, wherein said processor readable memory further stores processor executable instructions to establish two-way communication between said panel and said monitoring center.

30. The alarm system of any one of claims 22 to 29, wherein said processor executable instructions comprise instructions for providing said stored call-back address in response to sensing an alarm at the premises.

31. An alarm system for operating a monitoring center that receives signals indicative of sensed alarm conditions at a premises from an alarm panel over a packet switched data network, said alarm system comprising:

a network interface, for interconnecting said alarm system to the packet switched data network;

means for storing said list of call-back addresses at an alarm monitoring center for retrieval at said monitoring center upon receipt of an alarm notification from said panel;

means for maintaining a version of said list of call-back addresses at said panel;

means for initiating from said monitoring center retrieval of said version of said list, and retrieving to said monitoring center said version of said list of call-back addresses from said panel over the packet switched network;

means for updating said list of call back addresses at said alarm monitoring center, to correspond said version of said list of call-back addresses at said panel.

32. The alarm system of claim 31, wherein said call-back address comprises a cellular telephone number, stored automatically at said panel after said panel connects to a cellular network.

33. The alarm system of claim 31, further comprising means for retrieving said call-back address from said record and placing a telephone call to said call-back address, said telephone call for two-way communication between said panel and said monitoring center, in response to having received a reported alarm condition.

34. The alarm system of claim 33, wherein said telephone call is a voice over internet protocol (VoIP) call.

35. The alarm system of claim 31, wherein said call-back address comprises a PSTN telephone number, or an internet address.

36. The alarm system of claim 31, wherein said record includes at least one field for storing multiple call-back addresses, and wherein said method further comprises storing said multiple call-back addresses at said panel, and providing said multiple stored call-back addresses from said alarm panel to said monitoring center over said packet switched network.

37. The alarm system of claim 31, further comprising means for contacting said multiple call-back addresses from said monitoring center in a defined order in response to an alarm condition.

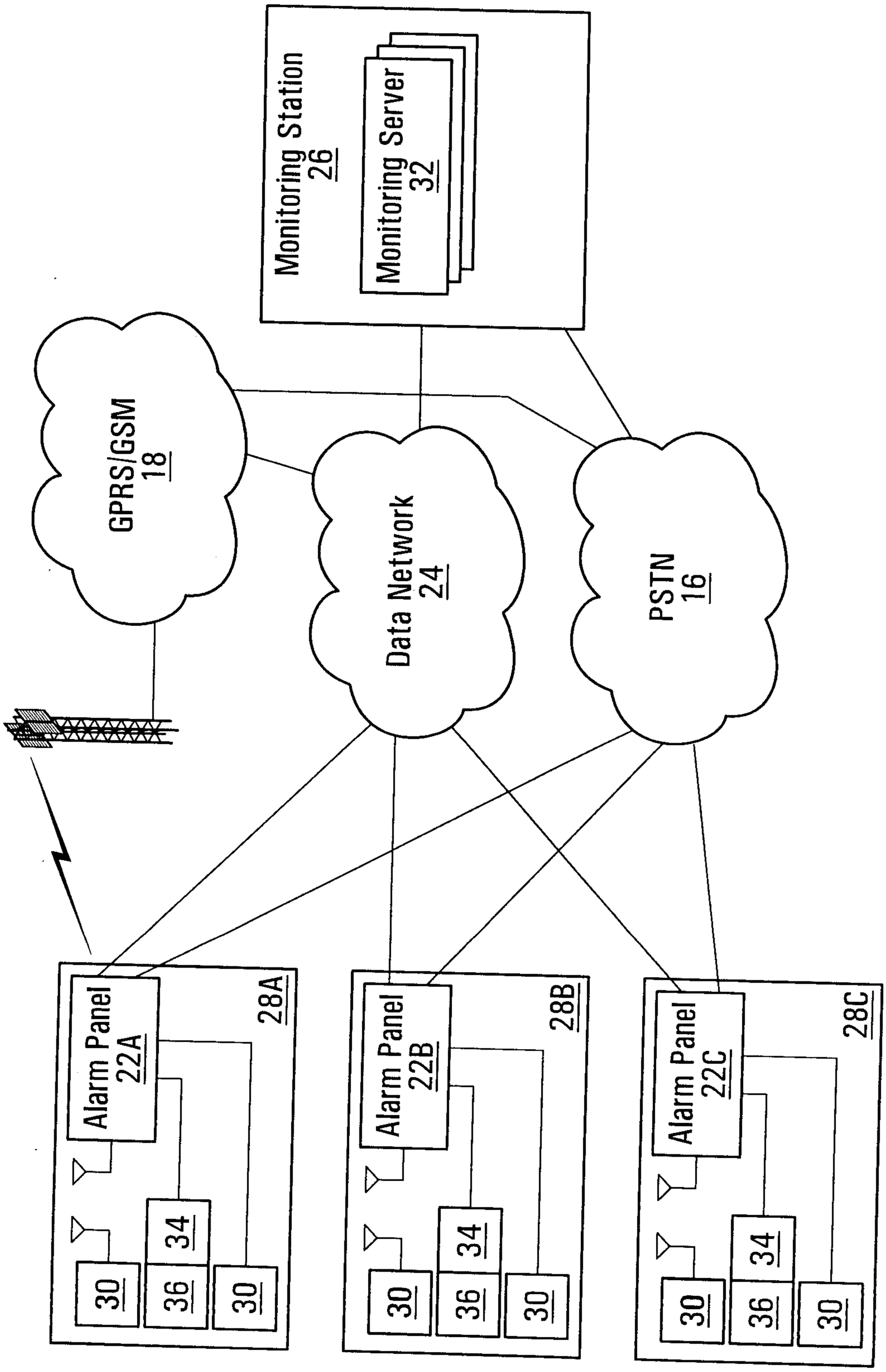


FIG. 1

Patent Agents
Smart & Biggar

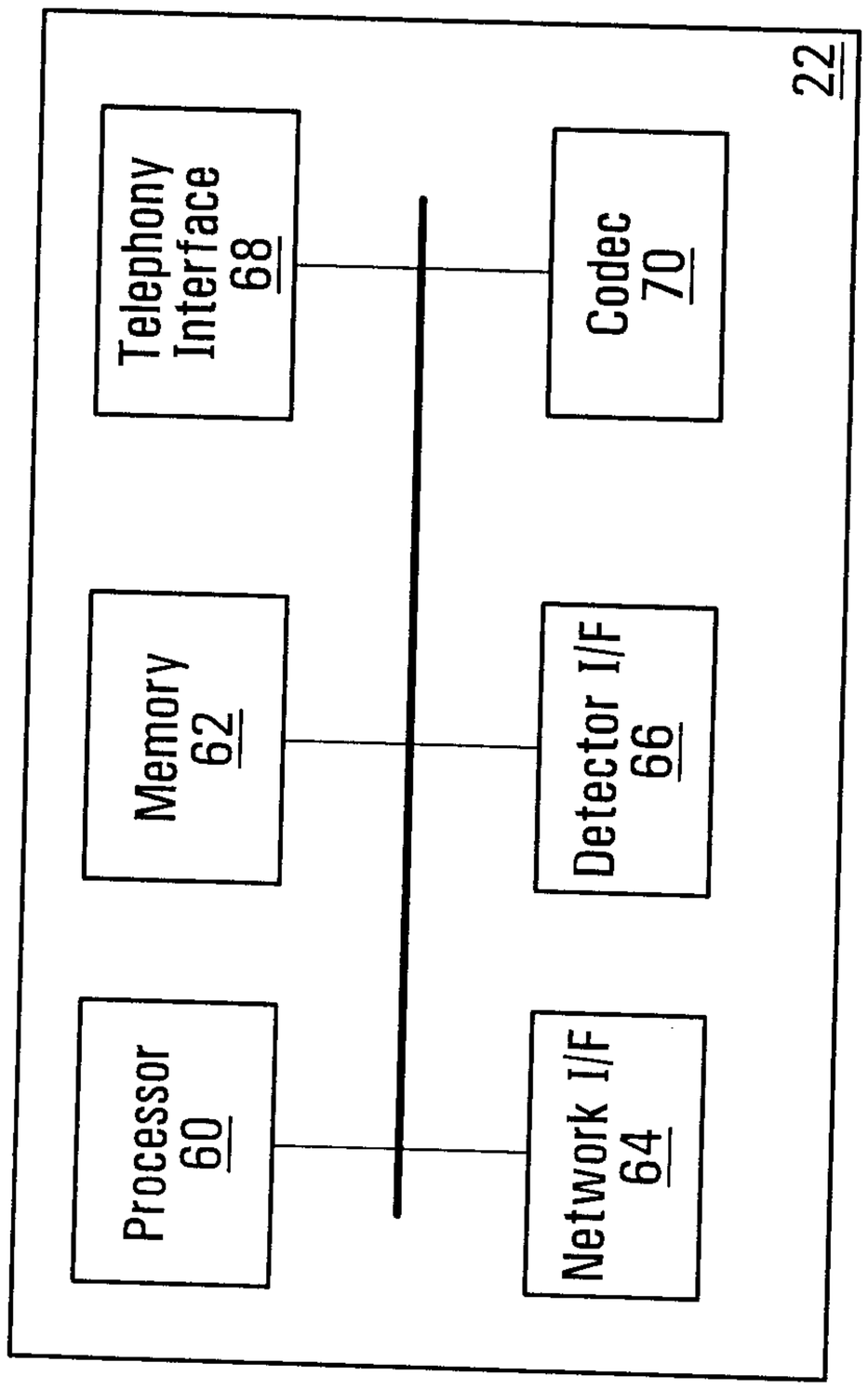


FIG. 2

Patent Agents
Smart & Biggar

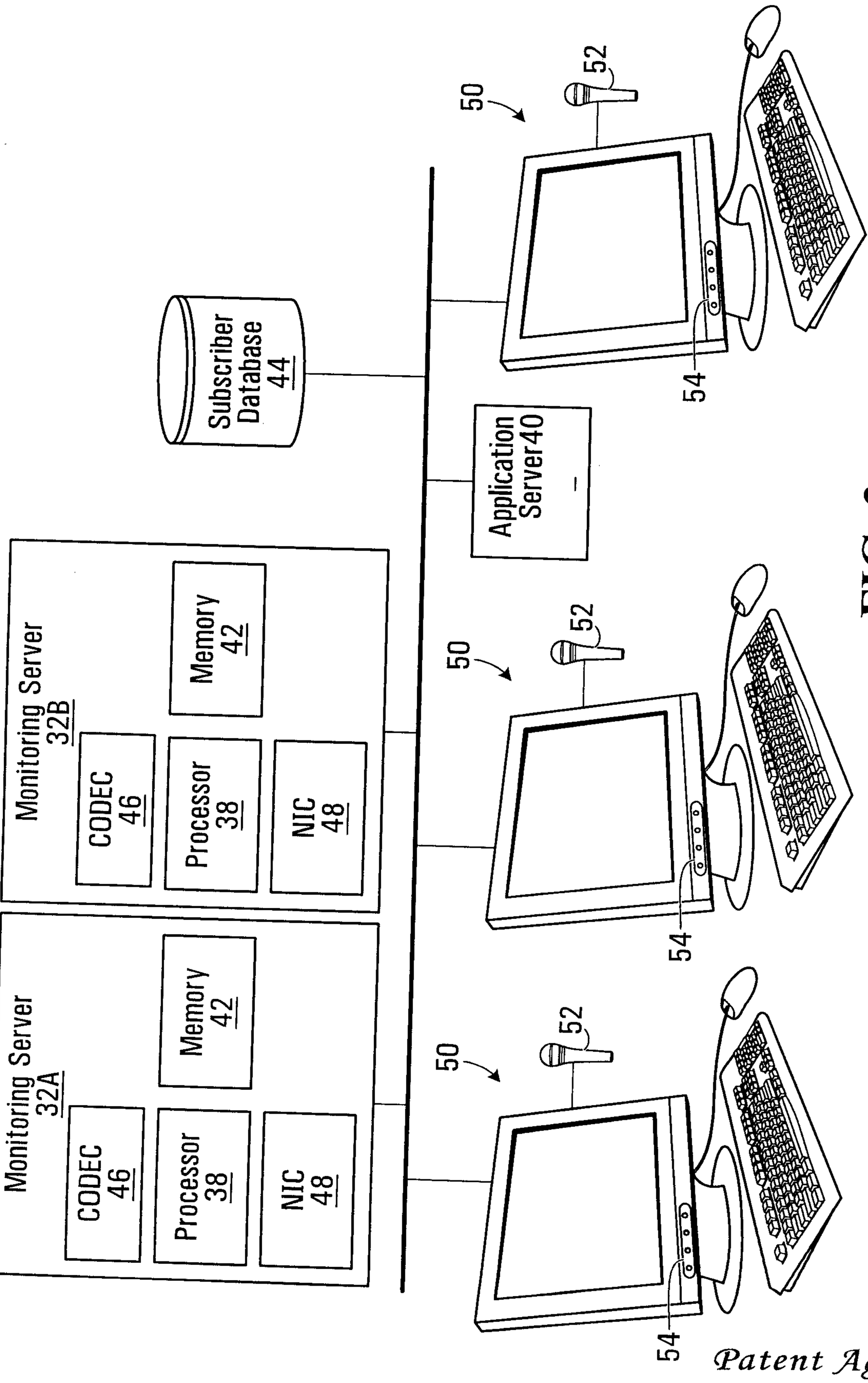


FIG. 3

Patent Agents
Smart & Biggar

80

Panel ID		Condition	Priority	Condition	Priority		Condition	Priority
Call-Back Address_1								
Call-Back Address_2								
...								
Call-Back Address_N								

FIG. 4

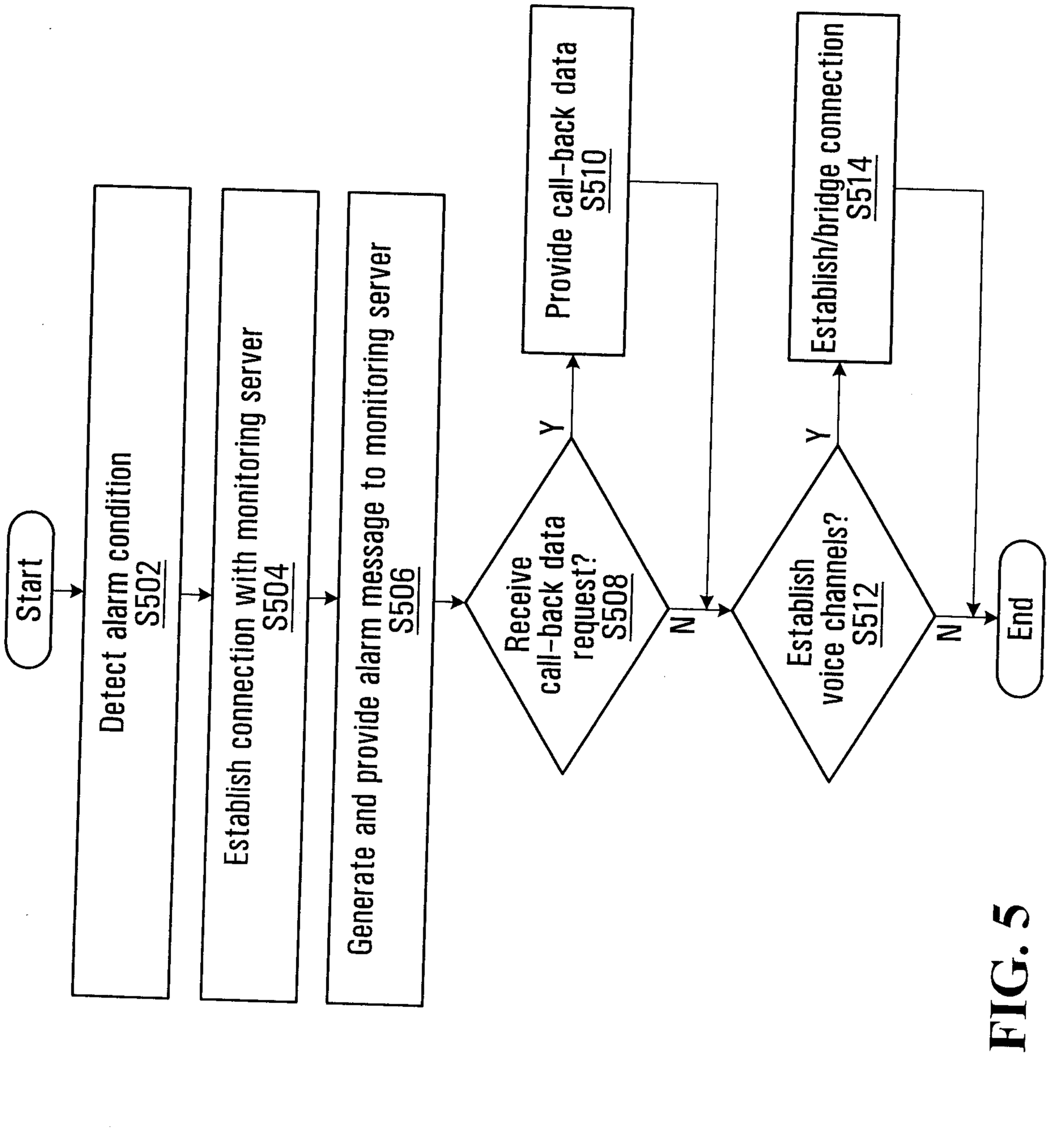

Start
Detect alarm condition
S502
Establish connection with monitoring server
S504
Generate and provide alarm message to monitoring server
S506
Receive call-back data request?
S508
Y
N
Provide call-back data
S510
Establish voice channels?
S512
Y
N
Establish/bridge connection
S514
End

FIG. 5

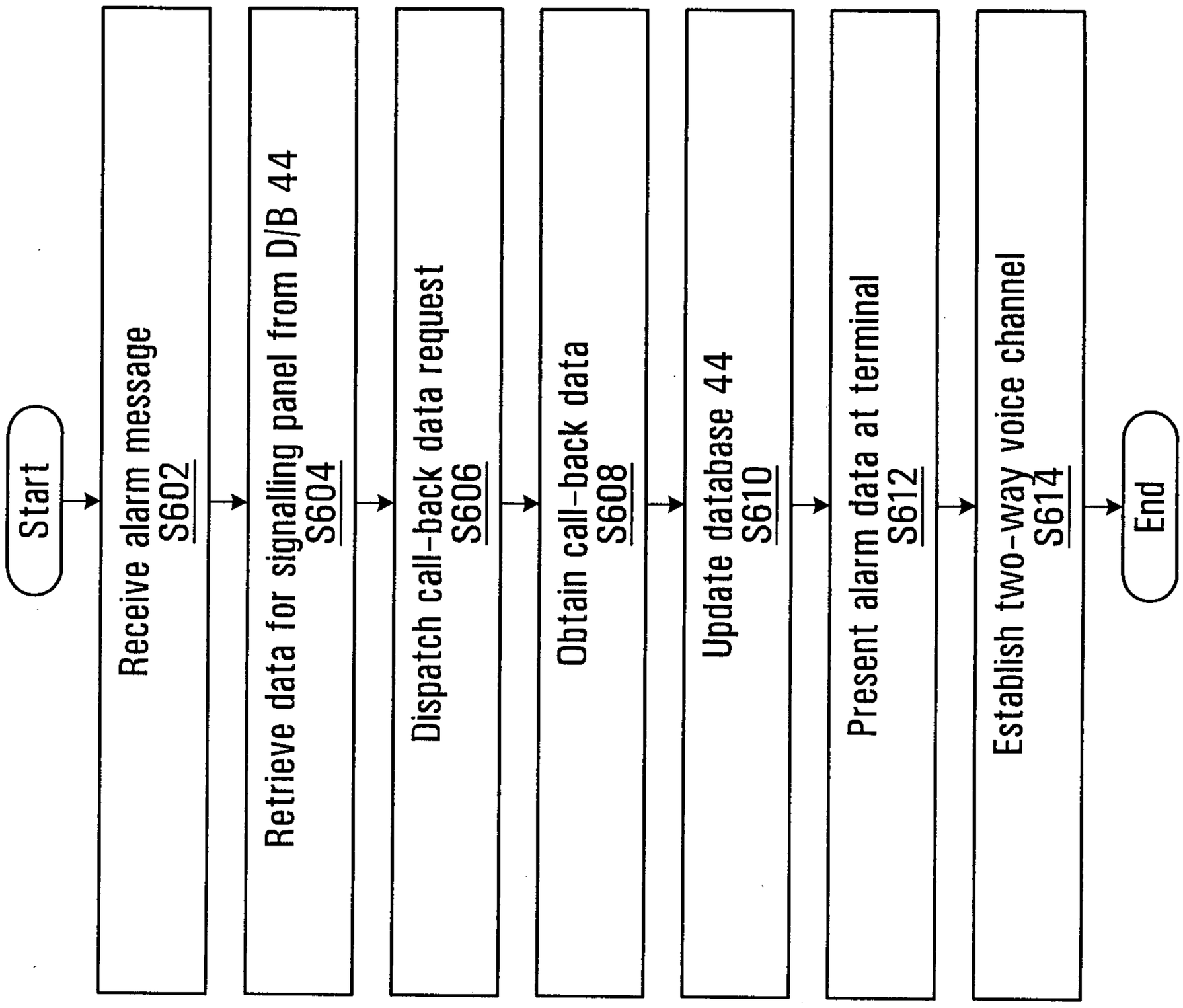
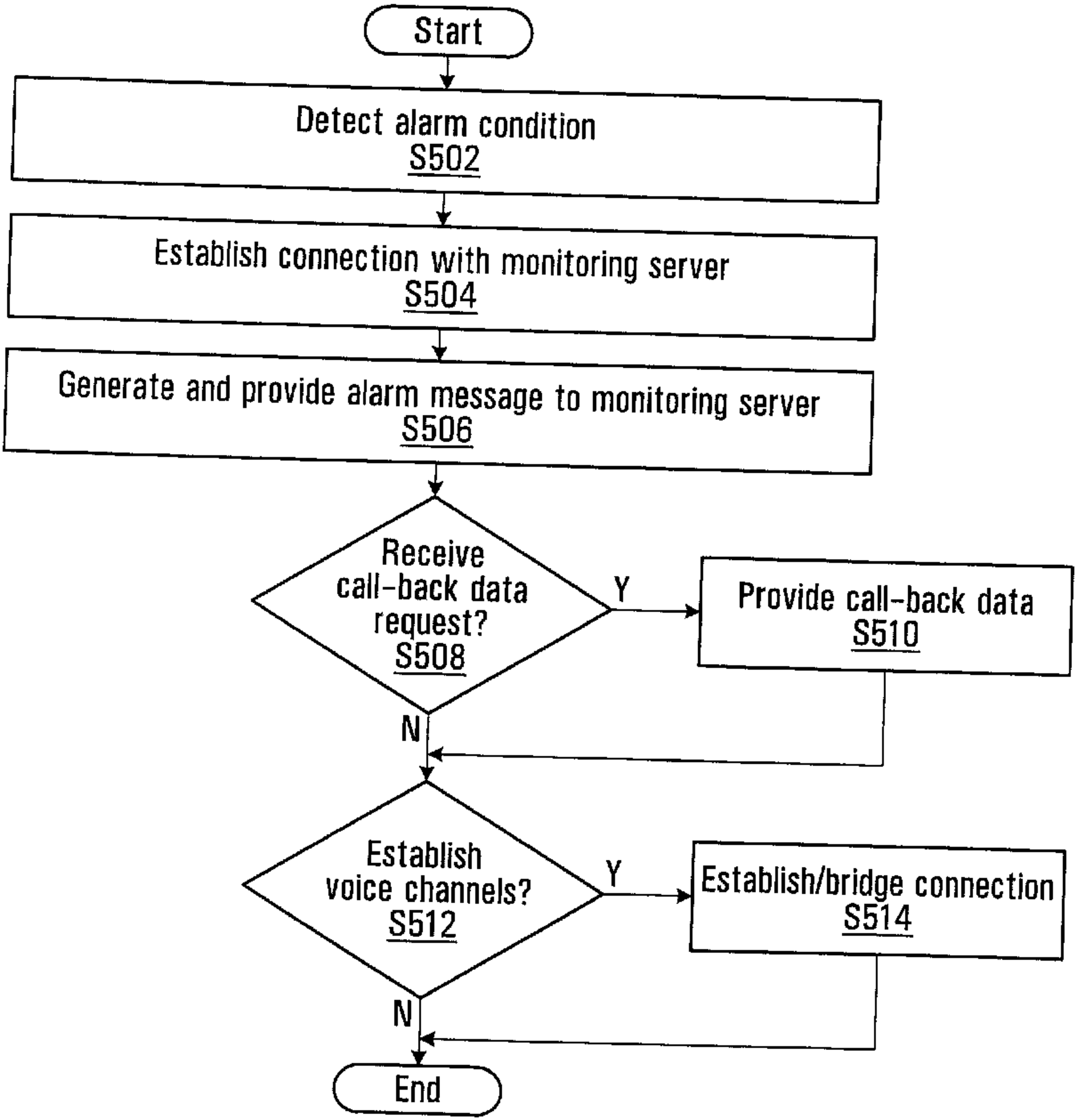


FIG. 6

Patent Agents
Smart & Biggar


Start
Detect alarm condition
S502
Establish connection with monitoring server
S504
Generate and provide alarm message to monitoring server
S506
Receive call-back data request?
S508
Y
Provide call-back data
S510
N
Establish voice channels?
S512
Y
Establish/bridge connection
S514
N
End