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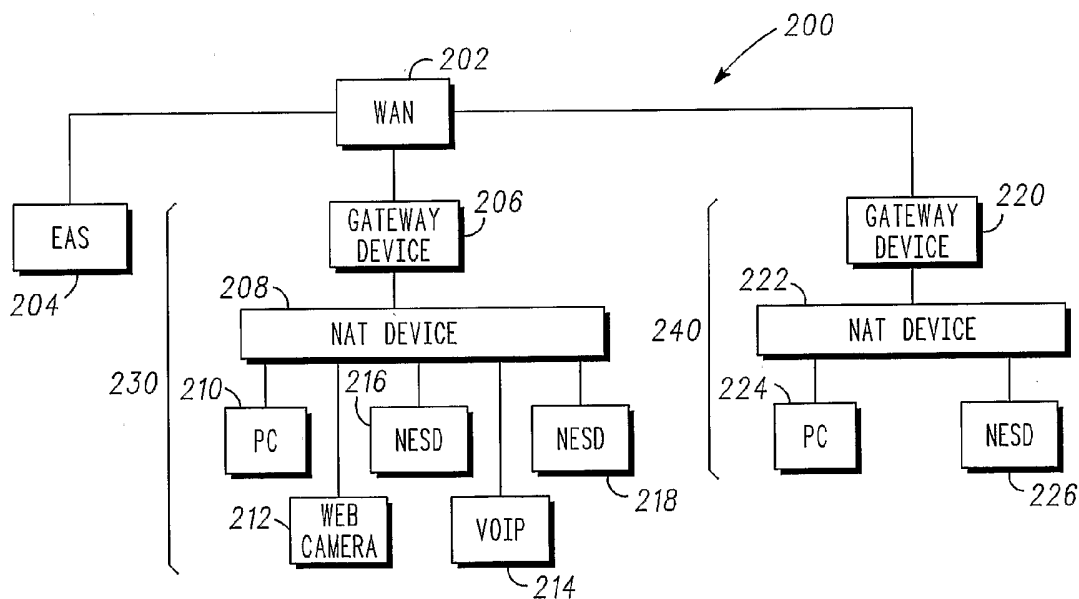
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(54) Title: NETWORK ENABLED SMOKE DETECTOR WITH EAS ALERTING SERVICE



(57) Abstract: A system and method for providing emergency notification messages is disclosed. The present invention provides for a system which includes a network enabled emergency alert system ("EAS") and a network enabled smoke detection ("NESD") device. In an exemplary embodiment of the present invention, the EAS is connected to a wide area network ("WAN"). A plurality of NESDs reside in a plurality of local area networks ("LAN") interconnected to the WAN. An emergency notification message originating from a local NESD or EAS is re-distributed to NESDs in the subnet of the physical emergency for alarm in the subnet.

WO 2006/026025 A2

**NETWORK ENABLED SMOKE
DETECTOR WITH EAS ALERTING SERVICE**

5

SPECIFICATION

FIELD OF THE INVENTION

[0001] The present invention relates to digital data networks. More specifically, the present invention relates to smoke detection and alarm systems over a digital data network.

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BACKGROUND OF THE INVENTION

[0002] Title 47 of the U.S. Code of Federal Regulations ("CFR") describes the U.S. Emergency Alert System ("EAS"). The EAS utilizes cable and broadcast television, AM, FM, and Low Power FM ("LPFM") signals to broadcast emergency alert/notification messages. However, there is a flaw in this conventional EAS. For a device to receive a broadcast emergency alert/notification message signal, the device must be (i) powered on, and (ii) in the listening and/or viewing range (in the case of a video signal) of the intended recipient(s).

15

[0003] Such devices are not typically powered on all the time. Thus, potentially life saving information often falls short of reaching many people in the targeted emergency notification location area(s). For example, people frequently sleep through tornado warnings broadcasted on television, because their television set is usual powered off while they are sleeping.

20

[0004] In addition to EAS notification messages, which may or may not reach the intended recipients, local home devices, such as smoke detectors and carbon monoxide detectors, are used by many people as a means of quick alert to an imminent local smoke or carbon monoxide problem. While these devices are always powered on to alert a person in close proximity to them, they are not capable of alerting a person remotely, like EAS notification. For example, unless you are in your home when a fire starting, you will not normally be notified until you return home, at which time your home could potentially be significantly destroyed.

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[0005] Thus, what is needed is a system and method to allow consumers to receive emergency notification messages whether from EAS or Local Emergency Notification Device ("LEND"), without the need to (i) have a conventional EAS emergency notification receiving device constantly powered on and in earshot or eyeshot of the intended recipient(s), or (ii) be in close proximity to the LEND which detected the emergency.

SUMMARY OF INVENTION

[0006] An object of the present invention is to provide for real-time emergency notification, whether from EAS or a LEND, without the need to (i) have a conventional EAS notification receiving device constantly powered on and in earshot or eyeshot of the intended recipient(s), or (ii) be in close proximity to the LEND which detected the emergency.

(0007) In order to achieve this objective, as well as others which will become apparent in the disclosure below, the present invention provides for a system including an EAS, with network connectivity, interconnected to a plurality of network enabled LENDs (also referred to as "network enabled alert device") via a digital communications network.

[0008] In an exemplary embodiment of the present invention, a network enabled LEND is a Network Enabled Smoke Detection ("NESD") device. A plurality of NESDs reside in a plurality of Local Area Networks ("LAN"), such as in homes, places of business, etc., and are interconnected to a Wide Area Network ("WAN") via LAN to WAN gateway devices.

[0009] In accordance with an exemplary embodiment of the present invention, when the EAS broadcasts an EAS emergency notification message, such notification is broadcasted over the WAN. Such notification may preferably include a subnet internet protocol ("IP") address, so as to define the targeted audience. All devices in the target audience subnet will receive the EAS emergency notification message. Upon receiving the EAS emergency notification message, receiving NESDs (in the target audience subnet) will alarm.

[0010] Conversely, if a particular NESD determines an emergency via its local internal detection mechanism(s), it will (i) trigger its internal alarm(s) (audible and

visual (if available)), (ii) alert other NESDs and network devices in its LAN to alarm in turn, and (ii) transmit an emergency notification message containing the emergency data to the EAS. The EAS then transmits the message to pertinent emergency services located in the reporting NESD's locality, and re-broadcast the emergency notification message to other NESD in the reporting NESD's locality. Locality may be defined by subnet.

[0011] Thus, the present system and method provides for real-time emergency notification, whether from EAS or a LEND without the need to (i) have a conventional EAS notification receiving device constantly powered on and in earshot or eyeshot of the intended recipient(s), or (ii) be in close proximity to the LEND which detected the emergency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] For a complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings in which like reference numbers indicate like features, components and method steps, and wherein:

[0013] FIG. 1 is an illustration of a network enabled LEND in the form of a NESD for network emergency notification message delivery in accordance with an exemplary embodiment of the present invention;

[0014] FIG. 2 is an illustration of a system for network emergency notification message delivery in accordance with an exemplary embodiment of the present invention;

[0015] FIG. 3 is a flow diagram showing the basic process flow of an emergency notification message originating from a NESD for the system of FIG. 2 in accordance with an exemplary embodiment of the present invention; and

[0016] FIG. 4 is a flow diagram showing the basic process flow of an emergency notification message originating from the EAS for the system of FIG. 2 in accordance with an exemplary embodiment of the present invention.

DESCRIPTION OF A PRESENTLY PREFERRED EMBODIMENT

[0017] Referring to FIG. 1, NESD 100 is shown. In accordance with an exemplary

embodiment of the present invention, NESD 100 includes an addressable network interface 102, processor 104, smoke sensor 106, audible alarm 108, and visual alarm 110. The network interface 102 allows the NESD 100 to be an address network device. In addition to and alternatively, "NESD 100 may include other types of emergency detection sensors such as a carbon monoxide sensor, a water flood sensor, high winds sensor, etc. Thus, as used herein NESD 100 is a network enabled LEND which may have numerous types of emergency sensors.

[0018] Referring to FIG. 2, system 200 is shown. System 200 is an illustrative system for providing emergency notification messages, where a plurality of NESD 100 devices are integrated therein.

[0019] System 200 includes a WAN 202. In accordance with this exemplary embodiment, the WAN 202 is the commonly known Internet. WAN 202 is interconnected to EAS 204, which features with network connectivity. Upon receiving information related to an emergency, EAS 204 serves such emergency data to NESDs 100 and other network devices, in the area of the emergency, in the form of emergency notification messages.

[0020] WAN 202 is also interconnected to a plurality of LANs 230, 240. Each LAN 230, 240 includes a gateway device 206, 220, respectively, for interconnection to the WAN. Each gateway device 206, 220 is typically interconnected to a Network Address Translation Device or "NAT" device 208, 222, respectively, which provides a means for private/local addressing within the LAN 230, 204. Local network devices are interconnected to and receive their private/local address from the NAT 208, 222.

[0021] LAN 230 includes the following network devices: Personal Computer ("PC") 210, web camera 212, Voice Over Internet Protocol ("VOIP") device 214, and two NESDs 216, 218. The two NESDs 216, 218 are used in the same single LAN 230 but are placed in different locations in accordance with this exemplary embodiment of the present invention. For example, if LAN 230 is in a house, NESD 216 could be placed on the ground floor and NESD 218 could be placed on the 2nd floor. LAN 240 includes PC 224 and NESD 226.

[0022] Using FIG. 2 as an illustrative example and referring to FIG. 3, in operation, in accordance with an exemplary embodiment of the present invention, when the smoke sensor 106 in NESD 216, senses an unacceptable level of smoke, in step 302, smoke

sensor 106 triggers the audible alarm 108 and visual alarm 110 of NESD 216, in step 304. This operation can occur point to point or via processor 104. Processor 104 receiving a signal from smoke sensor 106 of an unacceptable smoke level, transmits an emergency notification message to the EAS 204 via the WAN 202, and broadcasts
5 such message to the other NESDs 218 in the LAN 230, in steps 306 and 308 respectively.

[0023] In this way, NESD 218 will receive the emergency notification message (from NESD 216) and trigger its audible alarm 108 and visual alarm 110. Thus, if NESD 216 and NESD 218 are both physically located in a home, and NESD 216 is on the
10 ground floor and NESD 218 is on the second floor, a family sleeping on the second floor need not wait for the smoke from a fire to reach NESD 218 for alarm, which may be too late. Rather, NESD 218 will provide early notification of the emergency to occupants on the second floor based upon the emergency notification message received from NESD 216.

15 [0024] As to the emergency notification message NESD 216 transmitted to the EAS 204, the EAS 204, parses the message, if need for formatting reasons, and re-transmits the emergency notification message to the other NESDs and other network devices in the locality of the emergency by broadcasting to the subnet of the reporting NESD. In this case, assume LAN 230 and LAN 240 are in the same subnet. Thus, NESD 226 of
20 LAN 240 will receive the emergency notification message which the EAS 204 broadcasted to the subnet. After reception, NESD 226 will trigger its audible alarm 108 and visual alarm 110. This is extremely valuable in places of adjoined dwelling, rowhouses, shopping strip mall, etc. In addition to the above, the EAS 204 may also notify emergency service providers e.g., hospitals, fire departments, etc., physically
25 located in the subnet, of the emergency for early response.

[0025] Referring to FIG. 4, in accordance with an exemplary embodiment of the present invention, a conventional emergency notification message received by the EAS 204 may originate from a non-networked source, e.g. 911 call. In this instance, such a conventional emergency notification message may be ported to a format
30 acceptable, if needed, for digital transmission to NESDs 100 and other network devices. (A variety of commonly known methods such as speech to text, or simply text to text transmission (depending on the source format of the conventional

emergency notification message) may be utilized). In this case, similar to the above described operation, the EAS 204 will transmit the emergency notification message to the other NESDs and other network devices in the subnet of the emergency occurrence, in step 402. Assume that the emergency has occurred in the subnet of LAN 230 and LAN 240. Thus, NESD 226 of LAN 240 and NESDs 216, 216 of LAN 230 will receive the emergency notification message which the EAS 204 broadcasted to their sub-net. After reception, NESDs 216, 218, 226 will trigger their audible alarm 108 and visual alarm 110, respectively, in step 404. In this way, notification can quickly reach all potentially affected persons regardless of the source of the emergency detection.

[0026] In addition to the above, in accordance with an exemplary embodiment of the present invention, other LAN devices can also distribute the emergency notification message once received. For example, PC 210 be configured to automatically send e-mails to pre-defined email addresses with text containing the emergency notification message. The PC 210 can further trigger the web camera 212 to capture an image at the time the emergency notification message is received and attach it to such e-mail messages. VOIP device 214 can place predefined telephone calls to other VOIP, wireless, or landline telephone devices including information contained in the emergency notification message (using commonly known text to speech techniques, or in the case of a wireless telephone a text message may be sent). Further, other network devices can be used for status reporting of the current condition(s) in response to the emergency notification message. For example, a network enabled thermostat could be used to provide the current room temperature data in an e-mail containing the emergency notification message from PC 210.

[0027] Thus, the present system and method provides for real-time emergency notification, whether from a EAS or a LEND, without the need to (i) have a conventional EAS notification receiving device constantly powered on and in earshot or eyeshot of the intended recipient(s), or (ii) be in close proximity to the LEND which detected the emergency.

[0028] Although the invention has been described herein by reference to an exemplary embodiment thereof, it will be understood that such embodiment is susceptible of modification and variation without departing from the inventive

concepts disclosed. For example, the Blue Tooth protocol can be used, in addition to the TCP/IP protocol, for the LAN broadcast of the emergency notification message from a NESD. All such modifications and variations, therefore, are intended to be encompassed within the spirit and scope of the appended claims.

WE CLAIM:

1. A network enabled alert device for providing emergency notification messages, said device comprising:
 - 5 a network interface, said network interface providing connectivity to other network devices to send and receive emergency notification messages;
 - a sensor coupled to said network interface, said sensor detecting an emergency and causing an emergency notification message to be generated; and
 - an alarm coupled to said sensor, said alarm triggering an indication of said
10 emergency in response to an emergency notification message,
2. The device of claim 1, further comprising a processor coupled to said sensor.
3. The device of claim 2, wherein said sensor is at least one of a smoke sensor,
15 carbon monoxide sensor, gas sensor, flood sensor, and high winds sensor.
4. A system for providing emergency notification messages, said system comprising:
 - a gateway device for providing an interconnect between a wide area network
20 and a local area network; and
 - a network enabled alert device coupled to said gateway device, said network enabled alert device monitoring a local proximity for at least one emergency condition; reporting said at least one emergency condition to at least one other network device or said network, in the form of an emergency notification message;
25 receiving at least one emergency notification message from at least one other network device or said network, and triggering an alarm in response to said at least one emergency notification message.
5. The system of claim 4 further comprising a network address translation device
30 interposed between said gateway device and said network enabled alert device, said network translation device providing local addresses to local area network devices connected thereto.

6. The system of claim 4, wherein said network enabled alert device further comprises a network address translation component for providing local addresses to local area network devices connected thereto.
- 5
7. The system of claim 4, wherein said network enabled alert device further comprises at least one of a Blue Tooth protocol transmitter and receiver for providing Blue Tooth protocol communication of emergency notification messages.
- 10
8. The system of claim 4 further comprising a network enabled emergency alert sub-subsystem communicatively coupled to said network enabled alert device, said subsystem providing emergency notification messages to said network enabled alert device or receiving emergency notification messages from said network enabled alert device.
- 15
9. The system of claim 4 further comprising a personal computer, said personal computers serving said emergency notification messages to pre-determined end user devices.
- 20
10. The system of claim 4 further comprising a voice over internet protocol device, said voice over internet protocol device providing notification of said emergency notification messages to at least one of other voice over internet protocol devices, wireless voice devices, and landline voice devices.
- 25
11. A method for providing emergency notification messages, said method comprising:
- detecting a local emergency condition in a network enabled alert device;
 - triggering an alarm in said network enabled alert device;
 - transmitting an emergency notification message comprising data pertaining to
- 30
- said emergency condition to other network devices or to said network
12. The method of claim 11, wherein said step of transmitting an emergency

notification message comprising data pertaining to said emergency condition to other network devices or to said network, comprises transmitting to other network devices in the same local area network as said network enabled alert device.

5 13. The method of claim 11, wherein said step of transmitting an emergency notification message comprising data pertaining to said emergency condition to other network devices or to said network, comprises transmitting to other network devices in the same subnet as said network enabled alert device.

10 14. The method of claim 11, wherein said step of transmitting an emergency notification message comprising data pertaining to said emergency condition to other network devices or to said network, comprises transmitting to an emergency alert subsystem.

15 15. A method for providing emergency notification messages, said method comprising:

transmitting an emergency notification message from an emergency alert subsystem; and

20 receiving said emergency notification message in a network device capable of providing alarm notifications in the local area of an emergency indicated in said emergency notification message.

25 16. The method of claim 15, wherein said step of receiving said emergency notification message in said network device comprises receiving said emergency notification message in a network enabled alert device.

17. The method of claim 16, wherein said network enabled device alarms upon receiving said emergency notification message.

30 18. The method of claim 15, wherein said step of receiving said emergency notification message in said network device comprises receiving said emergency notification message in at least one of a personal computer and voice over internet

protocol device.

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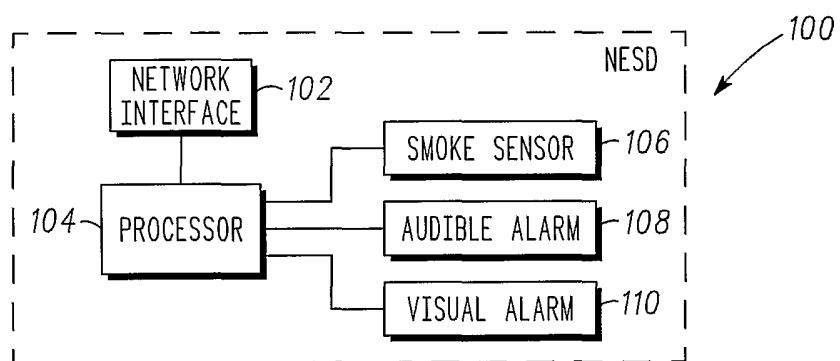


FIG. 1

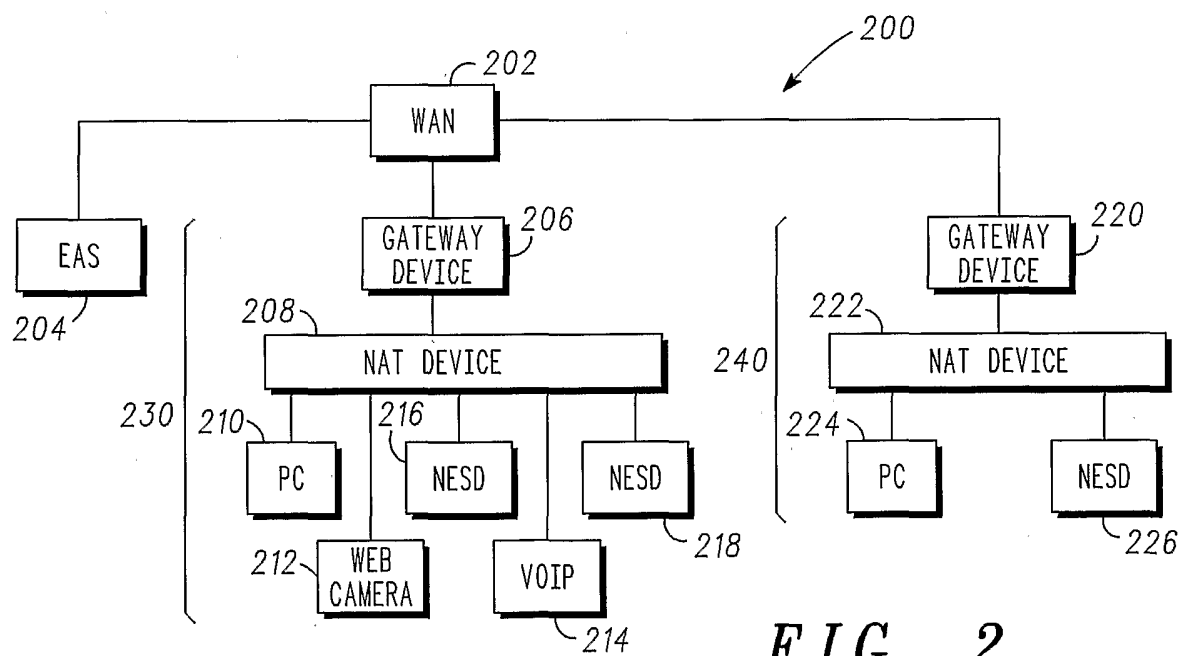
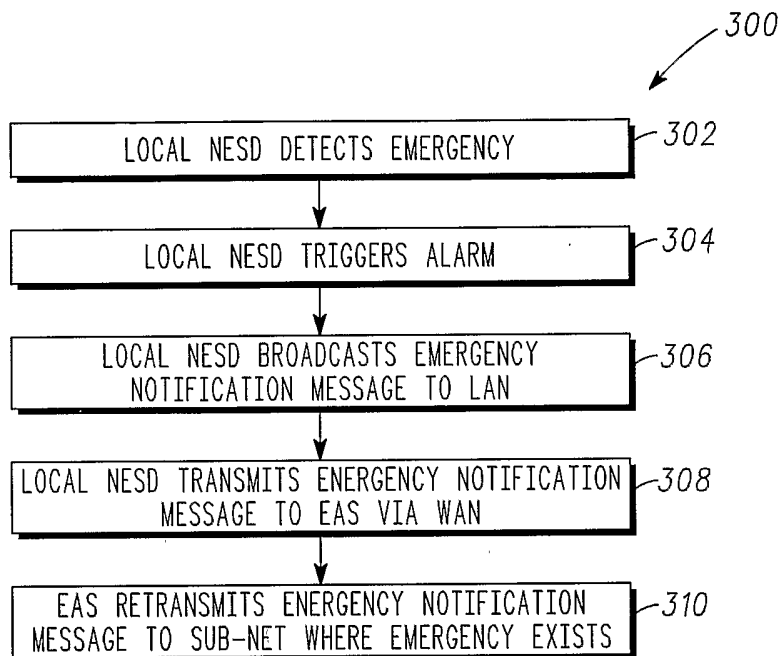
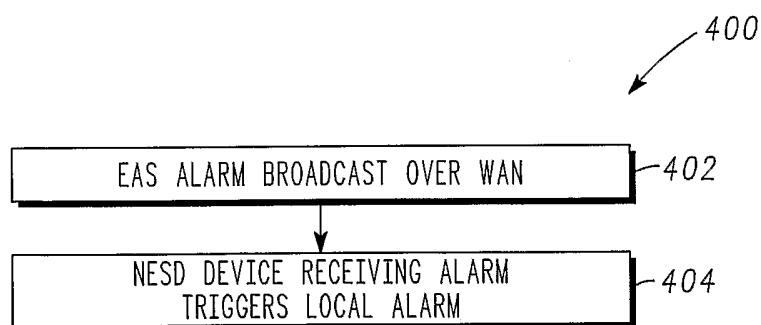


FIG. 2

2/2

*FIG. 3**FIG. 4*