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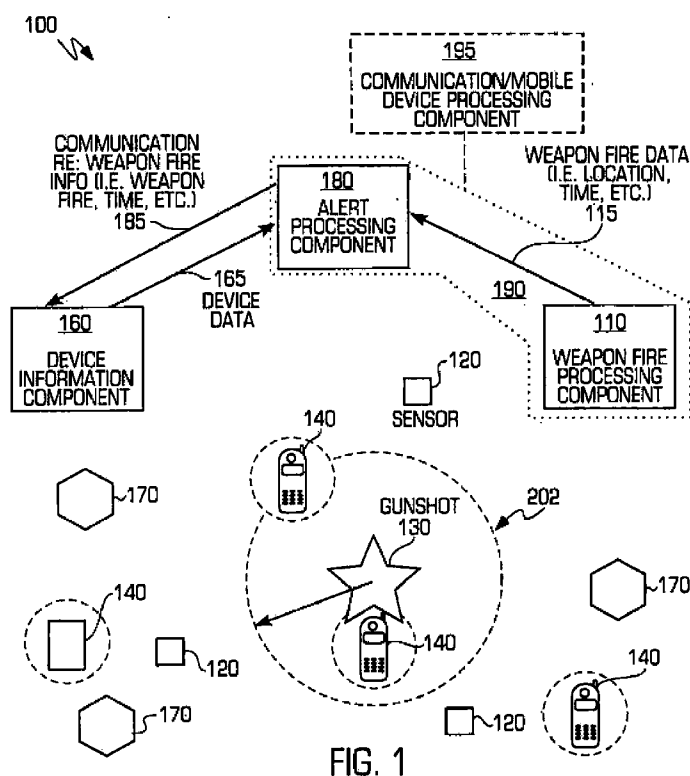


FIG. 1

(57) Abstract: Systems and methods are disclosed for processing information associated with weapon fire. In one exemplary embodiment, there is provided a method of processing information associated with weapon fire, including identifying a weapon fire incident, determining positional information regarding a source location of the weapon fire, and processing positional information regarding a device within a particular proximity of the source location of the weapon fire. Moreover, exemplary methods may include providing information for displaying the positional information of the source location of the weapon fire and the device together on a display. Other exemplary embodiments may include performing processing that provides one or more of source location of the weapon fire, device location information and/or other information related to the device for various uses.



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WEAPON FIRE LOCATION SYSTEMS AND METHODS INVOLVING MOBILE DEVICE AND/OR OTHER FEATURES

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CROSS REFERENCE TO RELATED APPLICATIONS

This PCT application claims priority to U.S. patent application No.
11/973,310, filed Oct. 5, 2007, which is incorporated herein by reference.

BACKGROUND

Field

The present invention relates generally to systems and methods for detecting and performing processing associated with noise and/or weapon fire incidents, and, more particularly, to features of identification and/or information processing associated with nearby devices.

Description of Related Information

Some gunshot location systems may use a network of dedicated acoustic sensors distributed throughout a region, e.g., on telephone poles or buildings. This type of system determines relative arrival times between sensors and triangulates locations of gunshot events, which may then be presented on a display to a user. Gunshot location systems such as this have been installed in a number of municipalities. They are useful in promoting public safety by providing fast notification of gunshot events to law enforcement officials. Even with immediate notification, however, it can take minutes for officials to arrive at the scene. By then, perpetrators may have fled and little evidence may remain

to help officials identify them. In addition, victims and witnesses may no longer be present to assist officials with valuable information or evidence. There is thus still a need for more effective ways to process information and/or assist officials in responding to gunshot events.

5

With this invention, innovations to weapon fire or gunshot location systems are provided, resulting in improvements to weapon fire location and processing as well as community safety.

SUMMARY

10 Systems, methods, and articles of manufacture consistent with the invention are directed to processing information associated with weapon fire.

In one exemplary embodiment, there is provided a method of processing information associated with weapon fire, including identifying a weapon fire incident, determining positional information regarding a source location of the
15 weapon fire, and processing positional information regarding a device within a particular proximity of the source location of the weapon fire. Moreover, exemplary methods may include providing information for displaying the positional information of the source location of the weapon fire and the device together on a display. Other exemplary embodiments may include performing
20 processing that provides one or more of source location of the weapon fire, device location information and/or other information related to the device for various uses.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not
25 restrictive of the invention, as described. Further features and/or variations may be provided in addition to those set forth herein. For example, the present invention may be directed to various combinations and subcombinations of the

disclosed features and/or combinations and subcombinations of several further features disclosed below in the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

5 The accompanying drawings, which constitute a part of this specification, illustrate various embodiments and aspects of the present invention and, together with the description, explain the principles of the invention. In the drawings:

FIG. 1 is a block diagram of an example system showing exemplary
10 interactions between weapons firing processing component, an alert processing component, and a device information component consistent with certain aspects related to the present invention;

FIG. 2 is a block diagram illustrating exemplary aspects of a gunshot location system computer interacting with an emergency dispatch computer and
15 a telephone company computer consistent with certain aspects related to the present invention;

FIG. 3 is a diagram illustrating exemplary mobile device trajectories intersecting near a gunshot location, which can be used for real-time situation display of an evolving gunfire incident consistent with certain aspects related to
20 the present invention;

FIG. 4 is an exemplary graphical representation showing display of weapon fire location, device location and other exemplary information derived from the device consistent with certain aspects related to the present invention;

FIG 5 is a flow chart illustrating an exemplary weapon fire processing
25 method consistent with certain aspects related to the present invention;

FIG. 6 is a flow chart illustrating an exemplary weapon fire and/or noise incident processing method consistent with certain aspects related to the present invention; and

FIG. 7 is a flow chart illustrating an exemplary weapon fire processing method consistent with certain aspects related to the present invention.

DETAILED DESCRIPTION

5 Reference will now be made in detail to the invention, examples of which are illustrated in the accompanying drawings. The implementations set forth in the following description do not represent all implementations consistent with the claimed invention. Instead, they are merely some examples consistent with certain aspects related to the invention. Wherever possible, the same reference
10 numbers will be used throughout the drawings to refer to the same or like parts.

 In embodiments of the invention, a weapon fire location system (or, more specifically, a gunshot location system) determines the locations of weapon fire, such as gunfire. According to exemplary aspects thereof, the locations of mobile
15 electronic devices near to the gunfire may then be obtained. For example, a system may obtain information about a cellular phone, whose location may be determined using E911 location information from cellular providers. Such exemplary gunshot location system may then present the gunshot location together with the mobile device locations on a single display, representation,
20 map, etc. Further, such mobile device users may either be in danger from flying bullets or may be the perpetrators of the gunfire. In either event, law enforcement officials can know in real time the weapons locations and mobile device locations on a detailed map, including integration thereof with other location information such as aerial photography. Law enforcement officers can
25 then respond immediately to assist or apprehend, or the mobile devices can be called to inquire if the user needs assistance. The dispersal or not of the mobile devices after the event may also indicate fleeing victims or suspects, or immobilized users. The owner identification from mobile device records will also

assist in preventing felons on probation from engaging in weapon fire activities. Potential witnesses to a crime may also be identified and their testimony can be solicited.

5 FIG. 1 illustrates an exemplary weapon fire location system 100 which may request mobile device information as set forth herein via available sources thereof, such as police, other law-enforcement or related, and other dispatch according to one embodiment of the invention. According to aspects of the implementations illustrated, upon reception of acoustic impulses from a gunshot
10 by acoustic sensors 120, the gunshot location 130 may be determined by a weapon fire processing component 110. Weapon fire data 115 such as time and location of the gunshot may be passed to an alert processing component 180, such as a police dispatch computer (or other law enforcement computer). There, for example, a processing component or dispatch operator may validate the
15 entity's interest in this event, and may send a communication 185 to a device information component 160 such as a telephone company computer including the location and time of the gunshot event. The device information component determines if there are any devices 140 such as mobile devices within a designated distance 202 of the gunshot at the time of the gunshot, and returns
20 device-related data 165 to the alert processing component, which may then display the gunshot and device locations together on a detailed map. In a cellular phone implementation, cellular towers 170 may be used by the mobile device component 160 to determine cell phone locations. Further, it should be noted that, while the various components are illustrated as shown in Fig. 1 for
25 the sake of explanation, other networked or distributed combinations of these components are within the scope of the invention. For example, the weapon fire processing component 110 may be integrated with the alert processing component 180, to form a unitary processing component 190.

Further, any of the functionality set forth herein may be implemented by various distributed or adjunct means, such as via an additional processing component 195 connected within the system 100. Other external processing components may also be accessed by the system, for example, to perform one or more of the processing steps or obtain various pieces of information described throughout. As such, the outputs of various computing components may be processed in combination to yield advantageous results and otherwise assist law enforcement in better providing for the community welfare. Innovations herein may include communicating with databases of this nature, such as databases containing one or more of government vehicle location information, blue force location information, automobile location information (Lo-Jack®, On-Star®), individual information related to elderly and/or young persons, medical information or information relating to humanitarian needs, etc., biographic information, website information, police information, terrorist information, person-location information, or any other various databases known to provide this or related information.

As described herein, a gunshot (or weapon fire) location system is a tool which presently permits law enforcement to respond quickly to an accurately located gunfire event. Additionally, several systems are available to determine location, ownership, movement and/or other aspects of mobile devices, such as cellular phones. As an example, the FCC has a requirement that cellular phones be locatable by the phone system operators to within 100 m of their actual position 67% of the time. This is known as an E911 (extended 9-1-1) requirement. This functionality is presently achieved in many areas, especially along arterial traffic routes. When a cellular phone is used to call 9-1-1, the dispatcher automatically knows the location of the caller. Thus the mobile phone

is brought into the same locatable category as when a landline owner calls 9-1-1 and the name and address is presented automatically to the dispatcher, per governmental regulation. For certain mobile devices, E911 cannot be used. However, other location providing systems and methods, such as Broadband
5 Network End-Point Locations (among others), may substitute or suffice.

According to one exemplary implementation, there is provided a method of processing information associated with weapon fire, including identifying a weapon fire incident, determining positional information regarding a source
10 location of the weapon fire, and processing positional information regarding a device or devices within a particular proximity of the source location of the weapon fire. Such devices may include one or more of communications devices (land or mobile phones, PDAs, other RF devices, etc.), mobile devices, a location-providing device (GPS, tracking or monitoring device, etc.) and/or other
15 devices set forth herein. Moreover, such exemplary methods may also include providing information for displaying the positional information of the source location of the weapon fire and the device together on a display. Some exemplary methods may also include acquiring information regarding the device or a person associated with the device (owner, etc.), and/or performing
20 processing that provides the various information processed for transmission as well as display. Other exemplary embodiments may include performing processing that provides one or more of source location of the weapon fire, device location information and/or other information related to the device for various uses.

25

Aspects of the innovation may also perform innovative processing related to or otherwise account for restriction regarding the various information sought. "In the United States, federal legislation considers location information from

mobile devices to be customer network proprietary information (CPNI), and can only be released with prior customer authorization except for emergency situations." The law enforcement or military uses contemplated in this invention should fall under and be permitted by the "emergency situation" exception. *The Development of Location Based Services in Mobile Commerce*, Charles Steinfield Department of Telecommunication Michigan State University, Priessl, B., Bouwman, H. and Steinfield, C. (eds.), Elife after the dot.com bust, Berlin: Springer.

Information concerning mobile phone usage the conversations and the location - is usually held as privileged for the user alone. Governmental access to such information is normally not permitted, except when crimes are committed. One example of this exception is that court usage of mobile phone records may be granted to assist investigation and as evidence presented to a jury. Law enforcement also has the right to stop and inspect (i.e., pat-down) a person if they are considered a threat to the officer or other persons. A verifiable report of gunfire from a gunshot location system may give probable cause to interrogate and if appropriate inspect someone in the vicinity of the known shot. Likewise this doctrine of probable cause may enable law enforcement to automatically receive from a cellular phone provider the location and identification of mobile phones (just as is presently done when the mobile phones are used to call 9-1-1). According to some aspects of the innovations herein, a gunshot location system output may be employed as an 'electronic citizen' calling on behalf of people in the vicinity of the gunfire.

FIG. 2 is a diagram illustrating an exemplary Gunshot Location System (GLS) 200 calling for cellular phone positions via emergency dispatch. Another exemplary gunshot location system is U.S. Patent No. 5,973,998 entitled

"Automatic Real-Time Gunshot Locator and Display System," which is incorporated herein by reference. In the exemplary system of FIG. 2, a Gunshot Location System computer 210 may provide gunfire data 215 such as location and time to an Emergency Dispatch Computer 280. This computer, either
5 automatically or under manual control from a dispatcher, may request 285 and receive 265 information from a Telephone Company Computer 260 regarding cellular phones 140 located near a gunshot location 130. Various other distributed and combined computing systems 290 and information processing may be employed by the present systems, as set forth and claimed herein.

10

During operational practice of exemplary gunshot locating systems, upon locating gunshot(s), the systems may be employed to sound an alarm and present a verifiable gunshot event to a computer screen. A dispatcher (or incident processing component) can then inspect the data, possibly listening to
15 the shots, confirm that this event should be acted upon, and initiate a manual or computer-to-computer request to all mobile phone providers to instantly present mobile phone locations if they are within a designated distance of the gunfire. The designated distance may be within a specified area or surrounding, it may be a distance such as within about 300 meters, triple the expected error of the
20 phone positions, or otherwise selected by practice as a function of the physics of the surroundings. This value can be adjusted as geography, topography and experience demand – for example, shrunk in heavily urbanized areas if too many mobile devices are detected within a designated distance. In certain
25 circumstances, the specified proximity would not be defined by a distance but a region, such as in a building, a train, a ship, etc. According to other exemplary systems, for example, the error in locating urban gunfire is likely to be significantly less than the exemplary 300 meters distance listed above.

Additional aspects of the innovations herein may include further processing steps related to transmission and receipt related to or other acquisition of information about nearby devices and/or their owners or users. For example, upon receipt of weapon fire location information, a processing component may transmit to a device processing component a request for specified information including one or both of location of mobile devices and/or identity of mobile device owners within the specified proximity. Determinations regarding whether incidents are authentic events, such as actual weapon fire events may also be included, as well. For example, such processing components, upon receipt of an authenticated weapon fire incident, may transmit to a mobile device processing component a request for specified information including one or both of location of mobile devices and/or identity of mobile device owners within the specified proximity. Further, processing components may also process instructions regarding provision of information for enabling a dispatcher to manually call a mobile device provider to provide weapon fire information and request location and identity information associated with mobile devices and/or their owners within a particular proximity of the weapon fire. Such innovation allow for more efficient and effective processing routines to address important response to identified incidents, whether such response is fully or partially automated.

According to these and other exemplary features, responding officers will know not only the gunfire locations, but the names and potentially other information about nearby device users. The dispatchers can also notice movement of the mobile devices before and after the event. Based upon such innovative provisioning of information, the dispatchers might in fact decide to call the mobile phones to inquire if the users need assistance or to ask if they can

provide an eyewitness account of the incident. Semi-automated call-back equipment already exists to assist with a rapid call back.

While mobile devices such as cellular phones are frequently addressed
5 herein, other devices and particularly other mobile device are part of the invention, including, for example, suitable communicating, location-providing or localized-ownership-providing devices, as well as ankle-constraintment devices used by law enforcement, correctional institutions, or the courts, PDA devices having GPS or other location determination method who broadcast their
10 positions to particular external entities, such as Wi-Fi, Wi-max, EVDO, etc., vehicle location devices such as LoJack or On-Star, mobile medical devices which transmit via RF or otherwise give alerts to crises and provide locations to medical personnel, government vehicle location information, "Blue Force" tracking units which update location of soldiers, vehicles, squad cars for
15 command centers, active RFID devices with suitable range capabilities, as well as any other mobile device carried by people or vehicles which communicate their position.

FIG. 3 is a diagram illustrating exemplary mobile device trajectories
20 intersecting near a gunshot location, which can be used for real-time situation display of an evolving gunfire incident consistent with certain aspects related to the present invention. A corresponding display may illustrate representative information available from such features, and may include mobile device owner activity of interest to the shooting. For example, exemplary display 300 shows
25 device user trajectories passing within a designated distance 202 of a gunfire event 130. Users of the three phones as plotted 310, 320 and 330 are walking, as indicated by their progress points and velocity, here perhaps between 2 and 3 MPH. Note that device users 310 and 320 are walking together until the gunfire

event, whereupon one stops suddenly, another slows down and then stops. In this example, then, they might initially or reasonably be considered victims. The third mobile device user 330 leaves the vicinity of the weapon fire after the incident and might be highlighted as a potential perpetrator or witness. Further
5 his exact location, and exit route may be known and transmitted to authorities. Similarly, if the 'after firing' travel path of the second mobile device user 322 is minimal or stops completely, he or she may be viewed as a possible victim of the weapon fire, and/or also as a witness. Further other activity of interest, such as the travel path of the first mobile device user after the incident 312 may also be
10 processed and analyzed to provide other important information about the incident or that user's involvement/witness thereof.

Further, a weapon fire processing component or other related or distributed processing components may perform various processes to provide
15 this graphical information. For example, such processing components may provide motion data regarding movement of a mobile device after the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display, or they may provide motion data regarding movement of a mobile device before the weapon fire, wherein the motion data is
20 provided for transmission in a manner suitable for graphical representation on a display. Further, they may provide motion data regarding movement of a mobile device before the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

25 FIG. 4 is an exemplary graphical representation showing display of weapon fire location, device location and other exemplary information derived from the device consistent with certain aspects related to the present invention.

As shown in the exemplary display 400 of FIG. 4, if there is or are 'persons of interest' who law enforcement officials already have the right to surveil, then these individuals could be tracked on the same map as is covered by the gunshot location system (e.g., felons, parolees, ankle-constrained detainees).

5 FIG. 4 illustrates an exemplary display 400 showing a weapon fire incident 130, as well as a location and/or travel path of a mobile device 402 and information associated with an owner of the mobile device 404. Thus, if such person of interest they were in the vicinity of a gunshot, their presence would be known. Likewise, friendly resources (the blue forces) could be tracked and then called
10 into action if a nearby event occurred. Commercial enterprises using cellular phones as the active device for Alzheimer's patents, for parents to track children, and for employers to track employees during work hours, and information such as this may also be selectively displayed on the map as desired.

15 FIG 5 is a flow chart illustrating an exemplary weapon fire processing method consistent with certain aspects related to the present invention. The process of FIG. 4 diagram one exemplary method of processing that may be undertaken from initial gunshots to final use of information, by computer systems, dispatchers, officers, etc. Similar methodologies to this and the
20 processes below may be implemented in military scenarios, where the dispatch computers are replaced by operational command center computers and the officers are replaced by soldiers on foot or in vehicles. Turning back to this example, there is provided a method of processing information associated with weapon fire, including identifying a weapon fire incident 510, determining
25 positional information regarding a source location of the weapon fire 520, and processing positional information regarding a device or devices within a particular proximity of the source location of the weapon fire 530. Moreover, such exemplary methods may also include providing information regarding

weapon fire and/or proximal devices 540. Other exemplary embodiments may include initiating access to additional information regarding a mobile/communication device, receiving data regarding a person associated with the mobile/communication device, providing information for displaying the positional information of the source location of the weapon fire, the positional information of the mobile/communication device, and the received data together on a display.

FIG. 6 is a flow chart illustrating an exemplary weapon fire and/or noise incident processing method consistent with certain aspects related to the present invention. In this exemplary process 600, a weapon fire and/or noise incident is first identified 610. Then, processors or operators may inquire of databases or processing centers to determine if mobile devices are nearby 620. If not 624, then the standard incident processing would be undertaken 630. If so 628, then augmented operations would be initiated. For example, the system or method may obtain and/or process data regarding initial device information 640. With this knowledge in hand, the systems or methods may then perform one or more secondary actions to determine secondary information about the device, owner, past or subsequent actions, etc. 650. Finally, appropriate subsequent action would then be determined 660 based on all of the various pieces of information obtained, the needs of the surrounding community, etc.

According to another example, after weapon fire is detected and located 710, 720, FIG. 7 shows further steps relating to additional exemplary processing. First, processors or operators may inquire of cellular phone operating companies if any cellular phones were nearby 730. If not 734, then the standard gunshot responses would be undertaken 740. If so 738, then augmented operations would be initiated, having two additional information sets – (1) cellular phone

identifying information 750 (principally phone numbers and owner names), and
(2) a history of cellular phone motions before and after the gunfire 755. The
information under (1) would be compared with lists of "persons of interest" 760
such as felons or parolees, and the information under (2) would be plotted on a
5 map (see Figure 4 for more details of such a mapping). From a combination and
consideration of these two sets 770, the processing component or dispatcher
might plausibly undertake one of the following three types of actions: (a) ignore
the cellular phone information 772, (b) call a particular phone 774 to inquire of
user "is assistance needed?" and/or "did you just witness an event?", and/or (c)
10 transmit instructions or dispatch 776 officers to either the gunfire location, the
present location of a cellular phone, or the residence of a cellular phone owner.

Various other features are included within the scope of this invention. For
example, if a 9-1-1 call arrives, via any of cellular, land or other telephony
15 communication, and the caller is near a recent gunshot location, then that call
can be prioritized higher if it is waiting in a queue. Similarly, if a 9-1-1 call
arrives, again via any of cellular, land or other telephony communication, and the
caller is near a recent gunshot location, a presumption can be made that it
should be routed to a nearby police force and not to a more distant jurisdiction.
20 Further, the phone and/or gunshot locations can be presented to mobile law
enforcement devices in, for example, government or official vehicles, such as
police cars, ambulances, etc. If a casing, shell, or bullet is found at the site of
gunfire, they can be entered into the national databases to correlate with known
weapons. A cross check with registered gun owners may reveal if their cellular
25 phone was present at or near the scene of a shooting, and their weapon tested
(if not previously tested) to compare with the evidence at the shooting.

In the military realm, mobile or cellular phones are used for communication and for operations, offering the possibility that enemy usage can be countered. For example, a military dispatcher could intercept messages near weapons or explosions. If a cell phone was used to detonate an improvised explosive devise (IED), its information just prior to the explosion could be known, as well as the phone which was calling it. Then the location and identify of the controlling phone could be known and appropriate action taken. Additionally, the prior history of the controlling phone might lead to knowledge of co-located phones which might be threats. Also, the code to control the IEDs might be discerned and that code could be sent to trigger explosions before the bombs were intentionally set off, possibly in the factory or on the route to deployment. A strategy could be implemented of pre-positioning GLS sensors to catch the expected sounds of explosions in concert with sending the code.

As disclosed herein, embodiments and features of the invention may be implemented through computer-hardware, software and/or firmware. For example, the systems and methods disclosed herein may be embodied in various forms including, for example, a data processor, such as a computer that also includes a database, digital electronic circuitry, firmware, software, or in combinations of them. Further, while some of the disclosed implementations describe source code editing components such as software, systems and methods consistent with the present invention may be implemented with any combination of hardware, software and/or firmware. Moreover, the above-noted features and other aspects and principles of the present invention may be implemented in various environments. Such environments and related applications may be specially constructed for performing the various processes and operations according to the invention or they may include a general-purpose computer or computing platform selectively activated or reconfigured by code to

provide the necessary functionality. The processes disclosed herein are not inherently related to any particular computer, network, architecture, environment, or other apparatus, and may be implemented by a suitable combination of hardware, software, and/or firmware. For example, various general-purpose
5 machines may be used with programs written in accordance with teachings of the invention, or it may be more convenient to construct a specialized apparatus or system to perform the required methods and techniques.

The systems and methods disclosed herein may be implemented as a
10 computer program product, i.e., a computer program tangibly embodied in an information carrier, e.g., in a machine readable storage medium or element or in a propagated signal, for execution by, or to control the operation of, data processing apparatus, e.g., a programmable processor, a computer, or multiple computers. A computer program can be written in any form of programming
15 language, including compiled or interpreted languages, and it can be deployed in any form, including as a stand alone program or as a module, component, subroutine, or other unit suitable for use in a computing environment. A computer program can be deployed to be executed on one computer or on multiple computers at one site or distributed across multiple sites and
20 interconnected by a communication network.

It is to be understood that the foregoing description is intended to illustrate and not to limit the scope of the invention, which is defined by the scope of the appended claims. Other embodiments are within the scope of the following
25 claims.

CLAIMS:

1. A method of processing information associated with weapon fire comprising:
5 identifying a weapon fire incident;
 determining positional information regarding a source location of the
 weapon fire;
 processing positional information regarding a communication device within
 a particular proximity of the source location of the weapon fire; and
10 providing information for displaying the positional information of the
 source location of the weapon fire and the communication device together on a
 display.
2. A method of processing information associated with weapon fire comprising:
15 Identifying a weapon fire incident;
 determining positional information regarding a source location of the
 weapon fire;
 processing mobile device information regarding a mobile device within a
 particular proximity of the source location of the weapon fire;
20 acquiring location information of the mobile device; and
 performing processing that provides both the source location of the
 weapon fire and the mobile device location information for transmission as well
 as display together on a display.
- 25 3. A method of processing information associated with weapon fire comprising:
 identifying a weapon fire incident;
 determining positional information regarding a source location of the
 weapon fire;

processing positional information regarding a mobile device within a particular proximity of the source location of the weapon fire; and
providing information for displaying the positional information of the source location of the weapon fire and the mobile device together on a display.

5

4. A method of processing information associated with weapon fire comprising:
identifying a weapon fire incident;
determining positional information regarding a source location of the weapon fire;

10 acquiring positional information of a communication/mobile device within a particular proximity of the source location of the weapon fire;

processing information relating to the communication/mobile device, wherein the information comprises data regarding one or more of the device, an owner of the device, and/or a user of the device; and

15 providing information for displaying the positional information of the source location of the weapon fire and the communication/mobile device together on a display.

5. A method of processing information associated with weapon fire comprising:

20 identifying a weapon fire incident;
determining positional information regarding a source location of the weapon fire;

processing information regarding a location-providing device within a particular proximity of the source location of the weapon fire, wherein the

25 information comprises positional information of the device and a person associated with the device; and

providing information for displaying the positional information of the source location of the weapon fire and the device together on a display.

6. A method of processing information associated with weapon fire comprising:
identifying a weapon fire incident;
determining positional information regarding a source location of the
5 weapon fire;
processing information regarding a telephonic/personal device within a
particular proximity of the source location of the weapon fire, wherein the
information comprises positional information of the telephonic/personal device;
and
10 providing information for displaying the positional information of the
source location of the weapon fire and the telephonic/personal device together
on a display.
7. A method of processing information associated with weapon fire comprising:
15 identifying a weapon fire incident;
determining positional information regarding a source location of the
weapon fire;
performing processing related to identifying what mobile/communication
devices are within a particular proximity of the source location of the weapon fire;
20 obtaining positional information of a mobile/personal device identified as
being within the particular proximity; and
initiating access to additional information regarding the
mobile/communication device;
receiving data regarding a person associated with the
25 mobile/communication device; and
providing information for displaying the positional information of the
source location of the weapon fire, the positional information of the
mobile/communication device, and the received data together on a display.

8. The method of claim 1 wherein the device is a mobile phone, a cell phone, a Wi-fi device, or a land phone.

5 9. The method of claim 1 wherein the information is position, location, phone number or owner of the device.

10 10. The method of claim 1 further comprising:

upon receipt of a weapon fire location, transmitting to a mobile device.

10 processing component a request for specified information including one or both of location of mobile devices and/or identity of mobile device owners within the specified proximity; and

receiving the specified information.

15 11. The method of claim 1 further comprising:

upon receipt of an authenticated weapon fire incident, transmitting to a mobile device processing component a request for specified information including one or both of location of mobile devices and/or identity of mobile device owners within the specified proximity; and

20 receiving the specified information.

12. The method of claim 1 further comprising:

25 processing instructions regarding provision of information for enabling a dispatcher to manually call a mobile device provider to provide weapon fire information and request location and identity information associated with mobile devices and/or their owners within a particular proximity of the weapon fire

13. The method of claim 1 further comprising:

providing output information including weapon fire data and mobile device data configured to enable graphical representation of weapon fire location and device location on the display.

5 14. The method of claim 1 further comprising:

providing motion data regarding movement of a mobile device after the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

10 15. The method of claim 14 further comprising:

providing motion data regarding movement of a mobile device before the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

15 16. The method of claim 1 further comprising:

providing motion data regarding movement of a mobile device before the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

20 17. The method of claim 1 further comprising:

flagging a mobile device phone number proximate to the weapon fire location either as a candidate to contact the owner or investigate further.

18. The method of claim 17 further comprising:

25 performing processing associated with communications to a response center processor, including executing instructions for a dispatch component to call the mobile device phone number or perform processing related to effecting a call to the mobile device phone number.

19. The method of claim 18 wherein the communications include requesting whether the user or owner of the mobile device needs assistance and/or whether they can provide witness information regarding witness related to the weapon fire
5 incident.

20. The method of claim 1 further comprising:
processing alert data instructions related to communications associated with the at least one processing component and an emergency processing
10 component, wherein the communications pertain to identifying the weapon fire location and prioritizing 9-1-1 calls as a function of each call's proximity to the weapon fire location.

21. The method of claim 1 further comprising:
15 processing alert data instructions related to communications associated with the at least one processing component and an emergency processing component, wherein the communications pertain to identifying the weapon fire location and routing 9-1-1 calls to emergency providers near, assigned to, or associated with the weapon fire location.

20 22. The method of claim 1 further comprising:
processing instructions associated with identifying possible persons of interest in connection with accessing biographic information regarding individuals located within the particular proximity; and
25 providing information enabling depiction of the possible persons of interest along with one or both of the source location of the weapon fire and mobile device location for transmission in a manner suitable for graphical representation on a display.

23. The method of claim 22, wherein the at least one processing components communicates with at least one database containing lists of persons of interest, biographic information, information derived from a website, police information, terrorist information, known accomplice information, vehicle location information, shell or casings databases, person location information, and/or employee location information.

24. The method of claim 1 further comprising:
10 processing instruction associated with identifying possible objects of interest in connection with accessing information regarding objects located within the particular proximity; and
 providing information enabling depiction of the possible objects of interest along with one or both of the source location of the weapon fire and mobile
15 device location for transmission in a manner suitable for graphical representation on a display.

25. The method of claim 24, further comprising:
 communicating with at least one databases containing one or more of
20 government vehicle location information, blue force location information, automobile location information (Lo-Jack, On-Star, etc.), individual information related to elderly and/or young persons, medical or humanitarian needs, etc., biographic information, website information, police information, terrorist information, person location information.

25
26. The method of claim 1 further comprising:
 processing data for calculations made subsequent to the weapon fire incident including comparison of mobile device location information with weapon

owner information associated with ballistic, ammunition or other weapon-related information obtained at the weapon fire incident location.

27. The method of claim 1 further comprising:

5 receiving mobile device communication data transmitted near in time to the weapon fire incident;

 performing identification processing regarding identifying information [location, ownership, called/related phones or owners thereof, etc.] associated with the mobile device.

10

28. The method of claim 27 further comprising:

 providing harm-prevention information to individuals within a region near to the weapon fire location via transmission of warning information to communication devices located near the weapon fire location.

15

29. A weapon fire location system comprising:

 a sensor that identifies a weapon fire incident;

 at least one processing component that:

 determines positional information regarding a source location of the

20 weapon fire;

 processes information from a communication device within a particular proximity of the source location of the weapon fire; and

 provides location information as a function of both the weapon fire location and the communication/mobile device information.

25

30. A weapon fire location system comprising:

 a sensor that identifies a weapon fire incident;

 at least one processing component that:

determines positional information regarding a source location of the weapon fire;

processes communication/mobile device information regarding devices within a particular proximity of the source location of the weapon fire;

5 and

provides information configured to display location information of both the weapon fire location and the device information for transmission as well as for display together on a display.

10 31. A weapon fire location system comprising:

a sensor that identifies a weapon fire incident;

at least one processing component that:

determines positional information regarding a source location of the weapon fire;

15 processes mobile device information regarding mobile devices within a particular proximity of the source location of the weapon fire; and

provides information that enables depiction of both the source location of the weapon fire and mobile device location for transmission in a manner suitable for graphical representation on a display.

20

32. The system of claim 29 wherein the at least one processing component, upon receipt of a weapon fire location:

transmits to a mobile device processing component requesting specified information including one or both of location of mobile devices and/or identity of

25 mobile device owners within the specified proximity; and

receives the specified information.

33. The system of claim 29 wherein the at least one processing component processes instructions regarding provision of information for enabling a dispatcher to manually call a mobile device provider to provide weapon fire information and request location and identity information associated with mobile devices and/or their owners within a particular proximity of the weapon fire.

34. The system of claim 29 wherein the at least one processing component further provides output information including weapon fire data and mobile device data configured to enable graphical representation of weapon fire location and mobile device location on a display.

35. The system of claim 29 wherein the at least one processing component provides motion data regarding movement of a mobile device after the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

36. The system of claim 35 wherein the at least one processing component further provides motion data regarding movement of a mobile device before the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

37. The system of claim 29 wherein the at least one processing component provides motion data regarding movement of a mobile device before the weapon fire, wherein the motion data is provided for transmission in a manner suitable for graphical representation on a display.

38. The system of claim 29 wherein the at least one processing component flags a mobile device phone number proximate to the weapon fire location as a candidate to contact.

5 39. The system of claim 38 wherein the at least one processing component performs processing associated with communications, to a response center processor or dispatch processor, including instructions for a dispatch component to call the mobile device phone number or cause the mobile device phone number to be called.

10

40. The system of claim 39 wherein the communications include instructions regarding requesting one or both of whether the user/owner/answerer of the mobile device needs assistance and/or whether he or she can provide information regarding witness related to the weapon fire incident.

15

41. The system of claim 29 wherein the at least one processing component processes alert data instructions related to communications associated with the at least one processing component and an emergency processing component, wherein the communications pertain to identifying the weapon fire location and
20 prioritizing 9-1-1 calls as a function of their proximity to the weapon fire location.

42. The system of claim 29 wherein the at least one processing component processes alert data instructions related to communications associated with the at least one processing component and an emergency processing component,
25 wherein the communications pertain to identifying the weapon fire location and routing 9-1-1 calls to emergency providers near, assigned to, or associated with the weapon fire location.

43. The system of claim 29 wherein the at least one processing component:
processes instruction associated with identifying possible persons of
interest in connection with accessing biographic information regarding individuals
located within the particular proximity; and
5 provides information enabling depiction of the possible persons of interest
along with one or both of the source location of the weapon fire and mobile
device location for transmission in a manner suitable for graphical representation
on a display.
- 10 44. The system of claim 43, wherein the at least one processing components
communicates with at least one database containing one or more of biographic
information, website information, police information, terrorist information, known
accomplice information, vehicle location information, person location information,
and/or employee location information.
- 15 45. The system of claim 29 wherein the at least one processing component:
processes instruction associated with identifying possible objects of
interest in connection with accessing information regarding objects located within
the particular proximity; and
20 provides information enabling depiction of the possible objects of interest
along with one or both of the source location of the weapon fire and mobile
device location for transmission in a manner suitable for graphical representation
on a display.
- 25 46. The system of claim 45, wherein the at least one processing components
communicates with at least one databases containing one or more of
government vehicle location information, blue force location information,
automobile location information (Lo-Jack)), individual information related to

elderly and/or young persons, medical or humanitarian needs, biographic information, website information, police information, terrorist information, and/or person location information.

- 5 47. The system of claim 29 wherein the at least one processing component:
 processes data for calculations made subsequent to the weapon fire
incident including comparison of mobile device location information with weapon
owner information associated with weapon/ballistic information obtained at the
weapon fire incident location.

10

48. The system of claim 29 wherein the at least one processing component:
 receives mobile device communication data transmitted near in time to the
weapon fire incident;
 performs identification processing regarding identifying information
15 associated with the mobile device.

49. The system of claim 38 wherein the at least one processing component:
 provides threat-prevention information to individuals within a region near
to the weapon fire location via transmission of warning information to
20 communication devices located near the weapon fire location.

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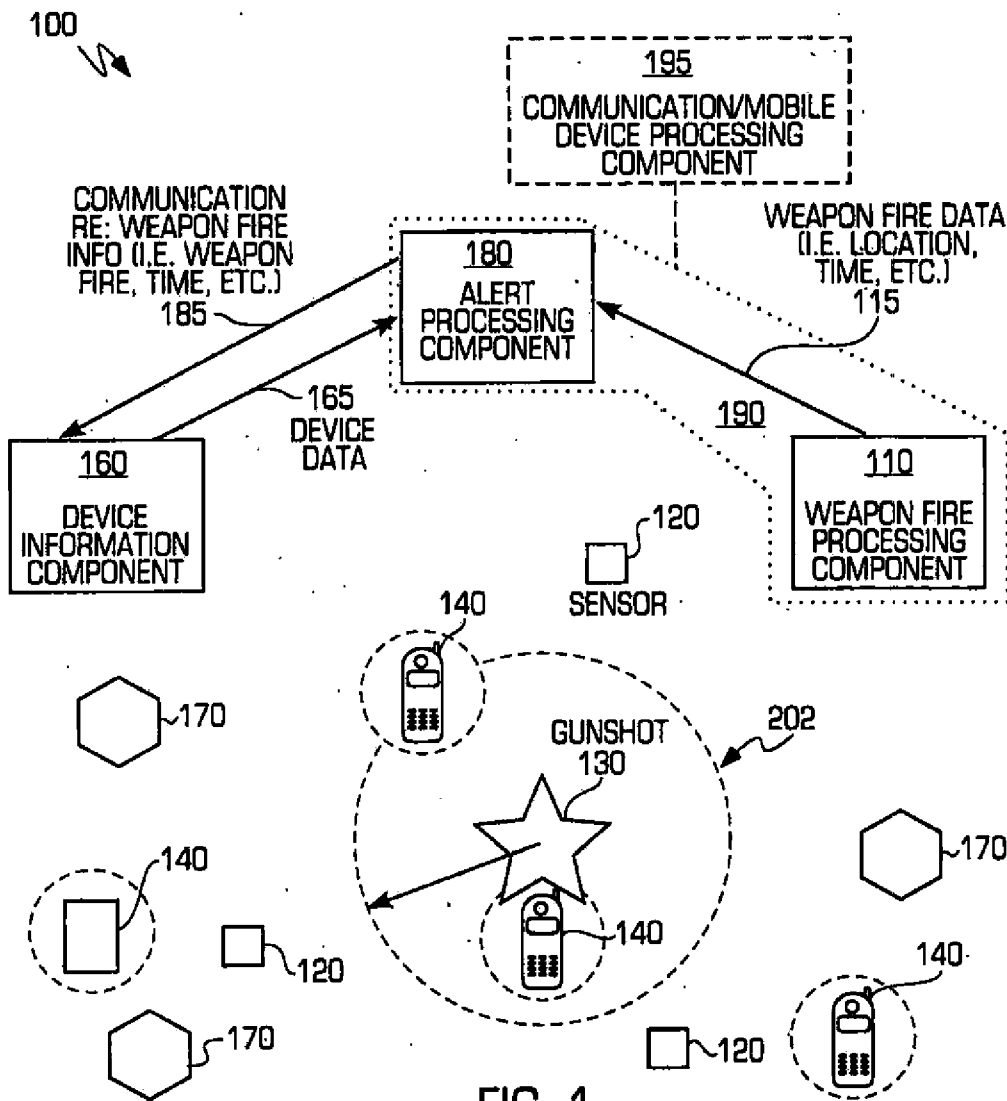


FIG. 1

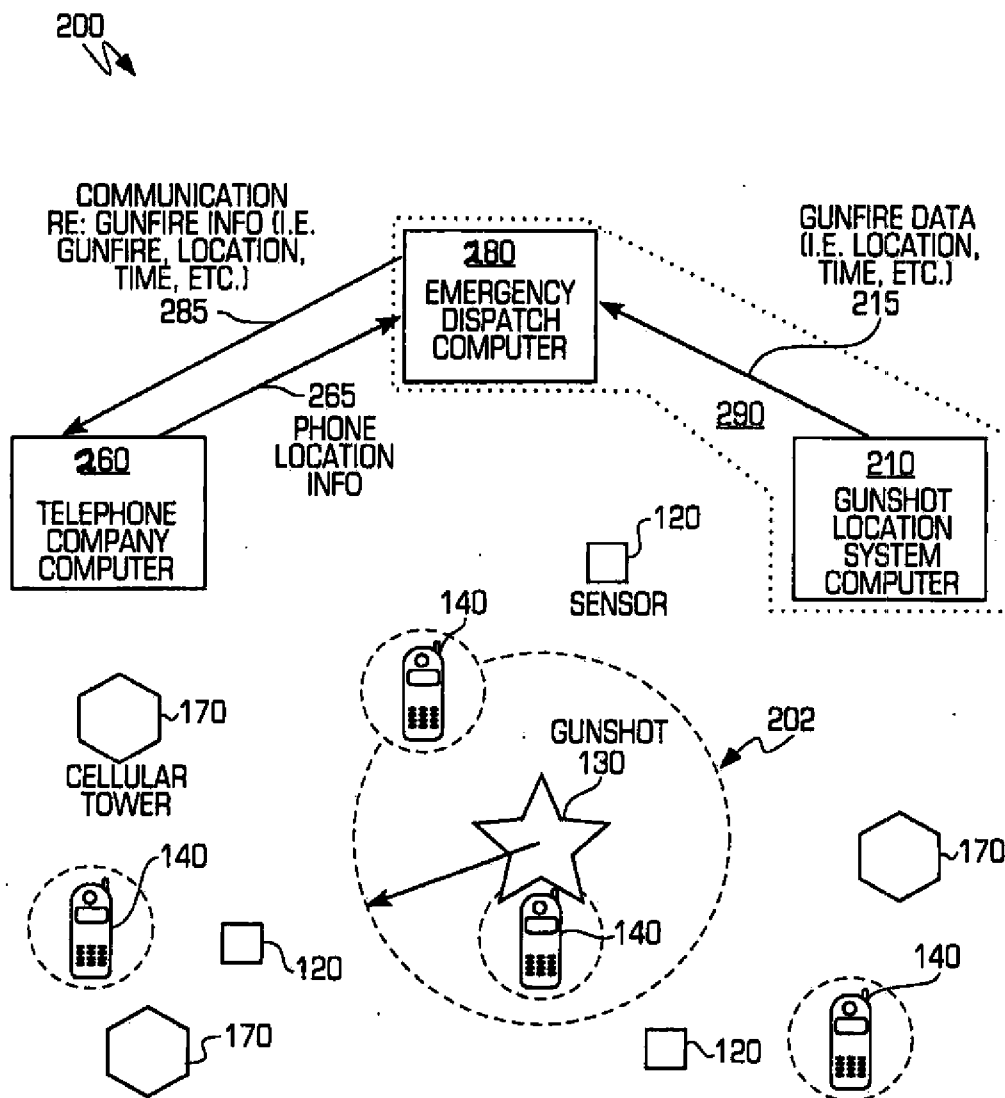


FIG. 2

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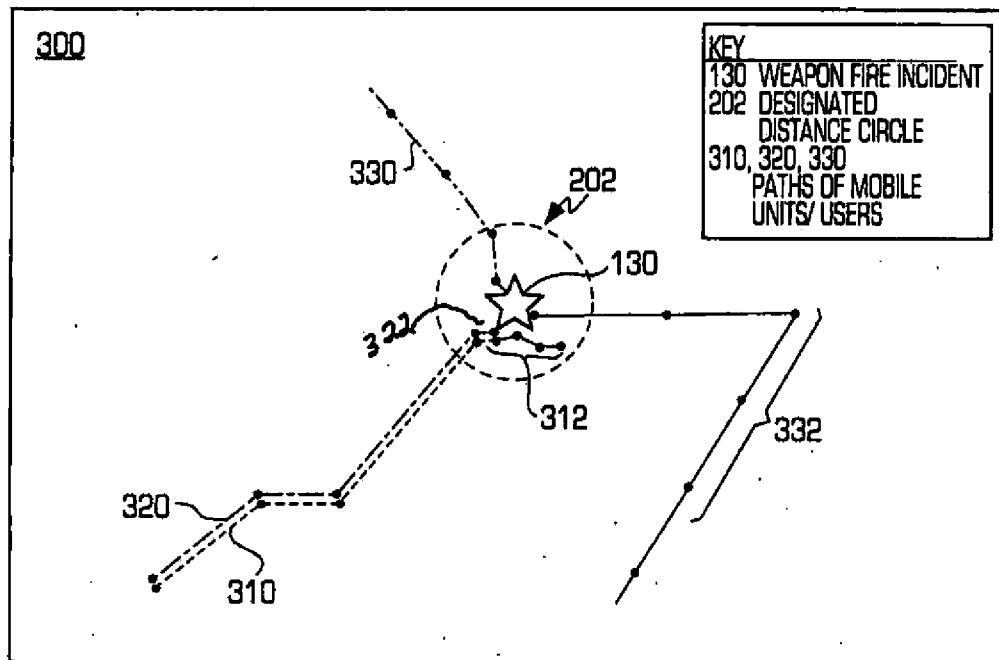


FIG. 3

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400

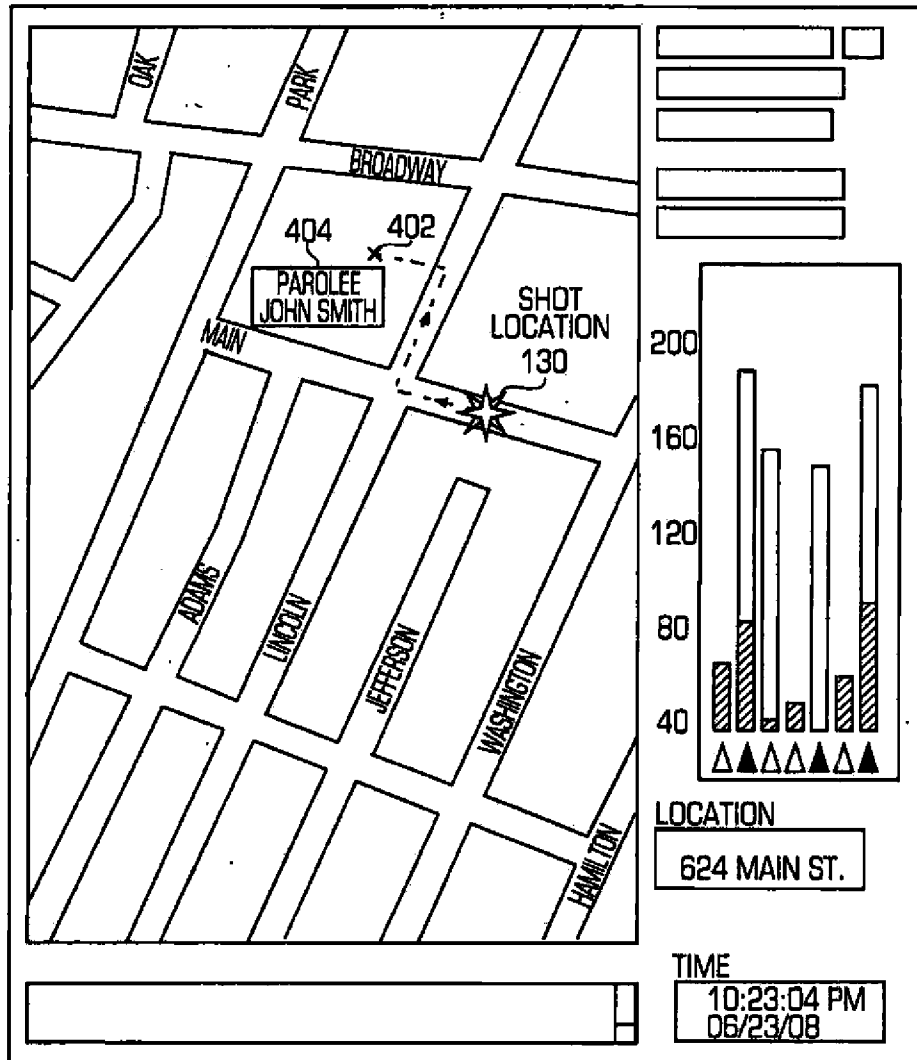


FIG. 4

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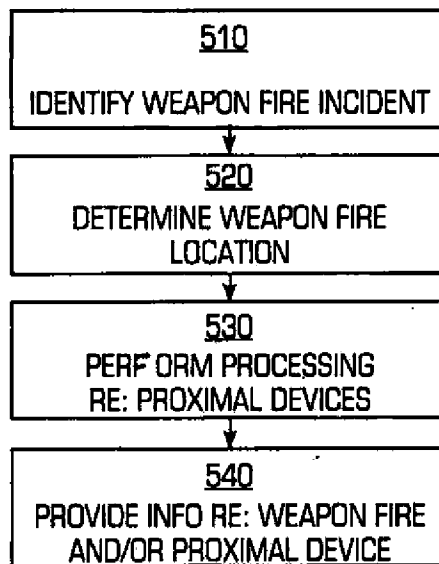


FIG. 5

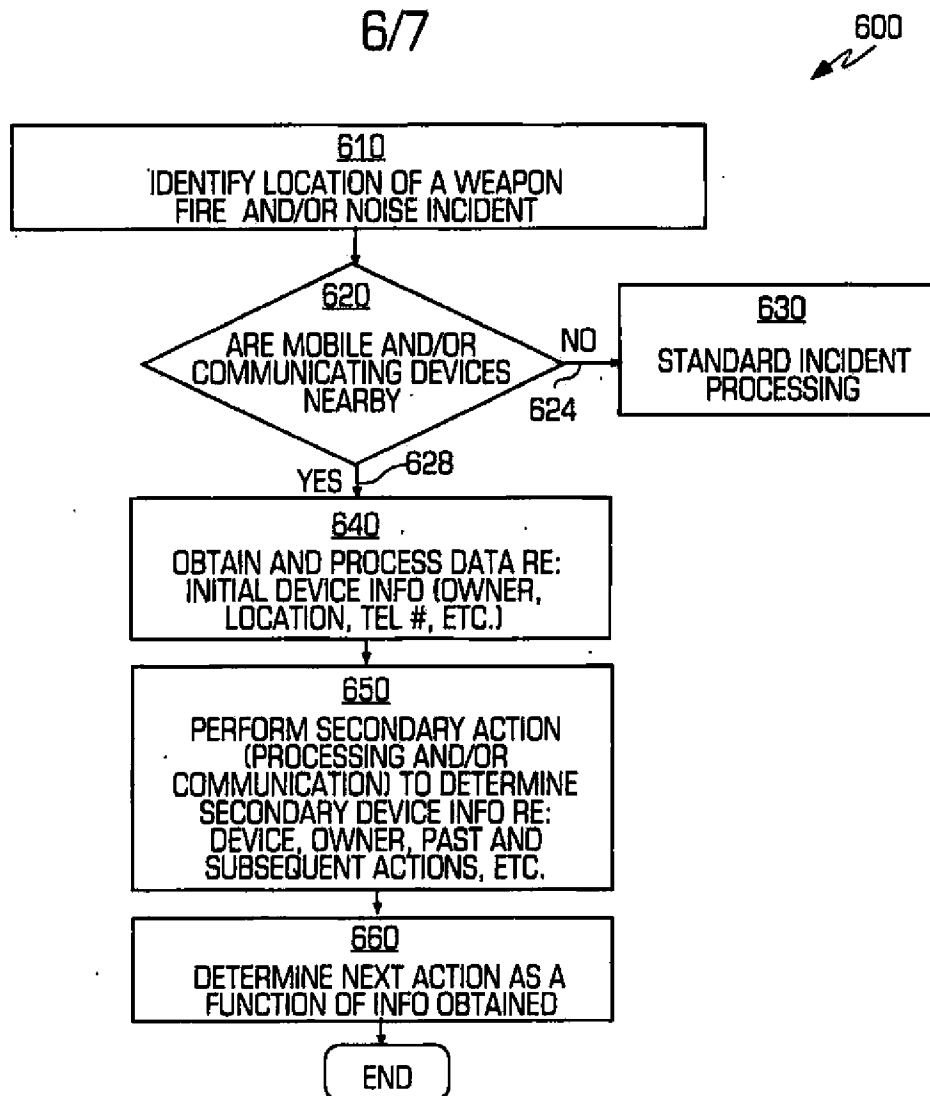


FIG. 6

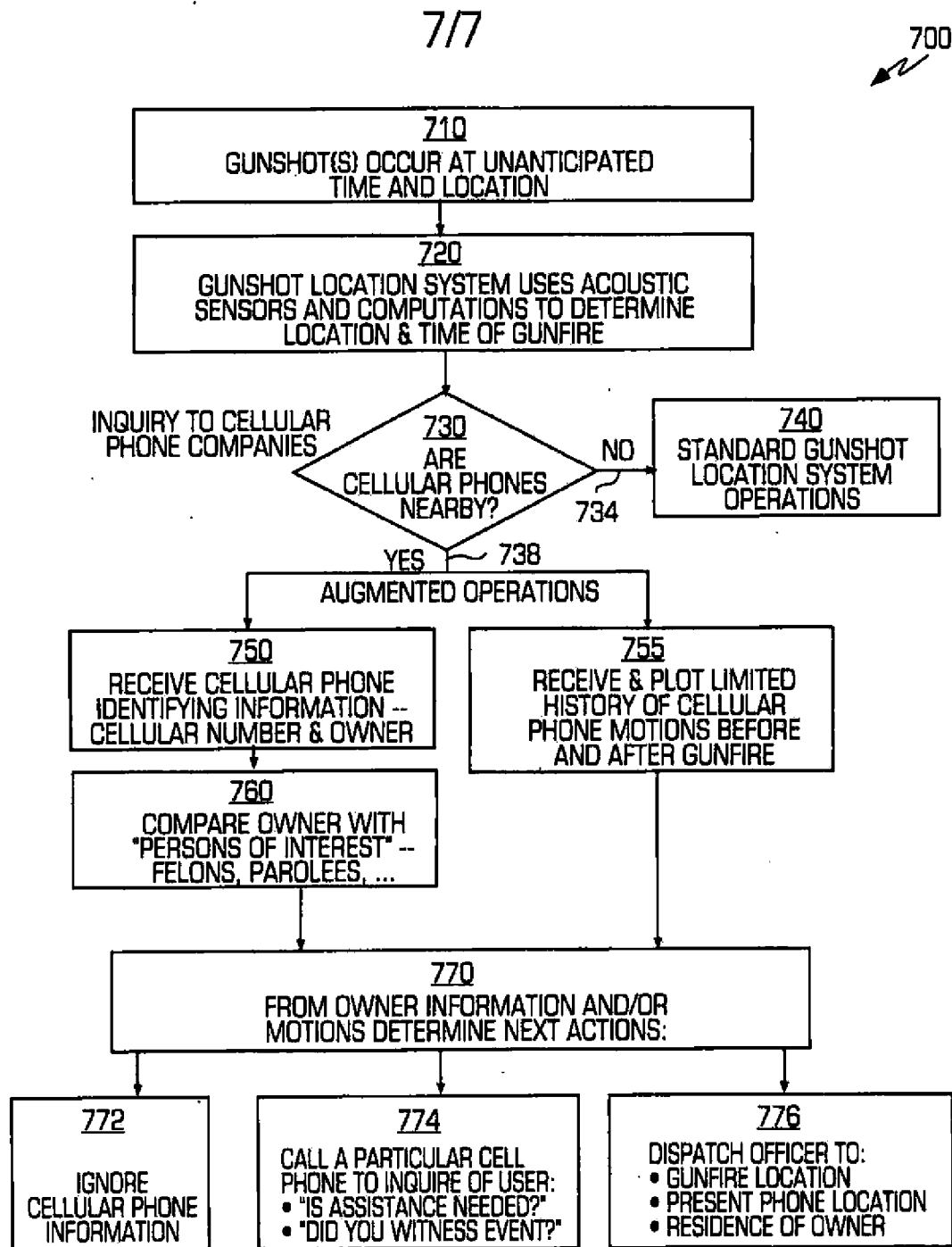


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/78840

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G01S 3/80 (2008.04)

USPC - 367/129

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)

IPC(8) ? G01S 3/80 (2008.04)

USPC ? 367/129

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8) ? G01S 3/80 (2008.04)

USPC ? 367/129; 367/127; 367/124; 367/118; 455/41.2; 455/456.1; 702/1

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

PubWest (USPT, PGPB, EPAB, JPAB), Google Scholar, WIPO, PubMed

Search terms - weapon fire, positional information, communication device, system, network, acoustic sensor, display, source, emergency, witness, police, armed force, dispatcher, information processing, mobile device, database, processor, library, notification

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0003470 A1 (Auerbach) 10 January 2002 (10.01.2002) (para [0003];[0009];[0010];[0018];[0019];[0021];[0022];[0025];[0027];[0031];[0035];[0042];[0052];[0054];[0059];[0061];[0063];[0067];[0078];[0092];[0099];[0101];[0103];[0104];[0106];[0107];[0108];[0109])	1-49



Further documents are listed in the continuation of Box C.



* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23 November 2008 (23.11.2008)

Date of mailing of the international search report

05 DEC 2008

Name and mailing address of the ISA/US

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