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(54) **MANUALLY INITIATING WIRELESS RECEPTION OF RESUSCITATION EVENT DATA FROM MEDICAL DEVICE**

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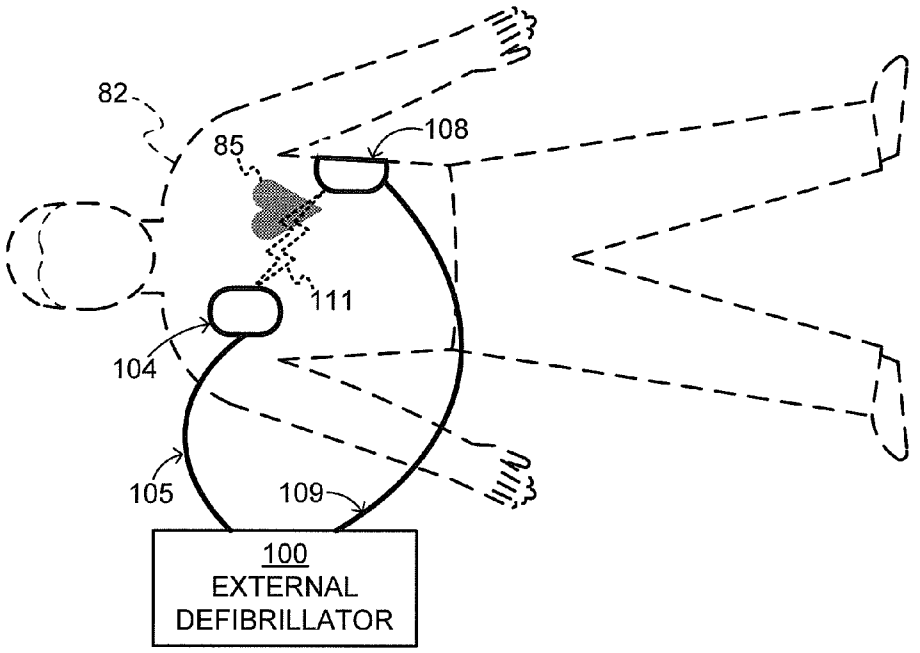
(57) **ABSTRACT**

An external defibrillator can include a bump sensor for generating motion information and a bump detector for determining whether the external defibrillator has been subjected to a local bump event. The external defibrillator can transmit wirelessly a data signal encoding resuscitation event data to a second external defibrillator over a wireless communication link between the two devices.



DEFIBRILLATION SCENE

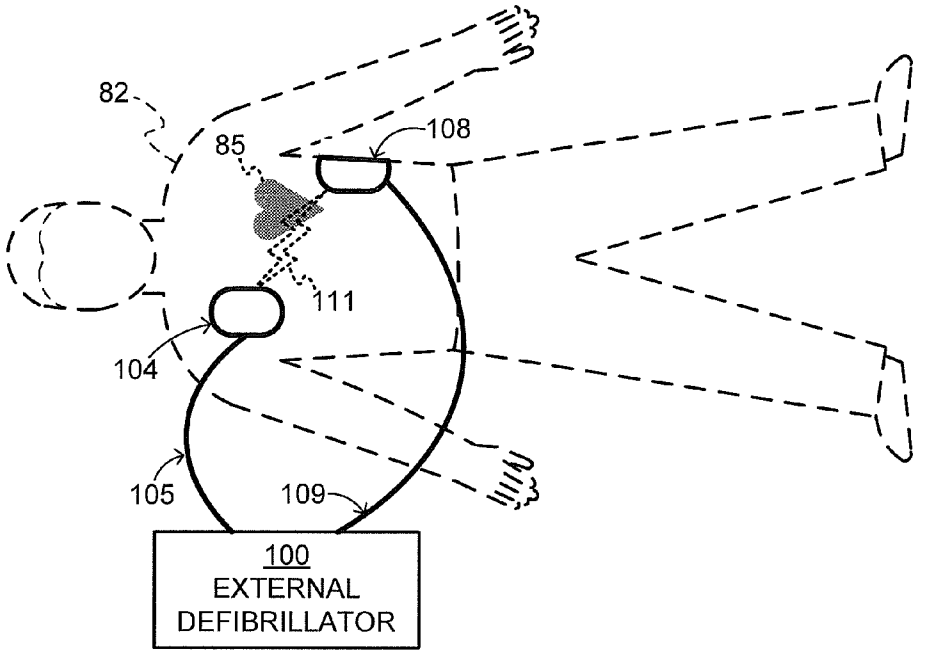


FIG. 1 *DEFIBRILLATION SCENE*

TYPE OF EXTERNAL DEFIBRILLATOR	INTENDED TO BE USED BY PERSONS:	
	IN THE MEDICAL PROFESSIONS	NOT IN THE MEDICAL PROFESSIONS
DEFIBRILLATOR – MONITOR	√	
AED	√	√

FIG. 2 *TWO MAIN TYPES OF EXTERNAL DEFIBRILLATORS*

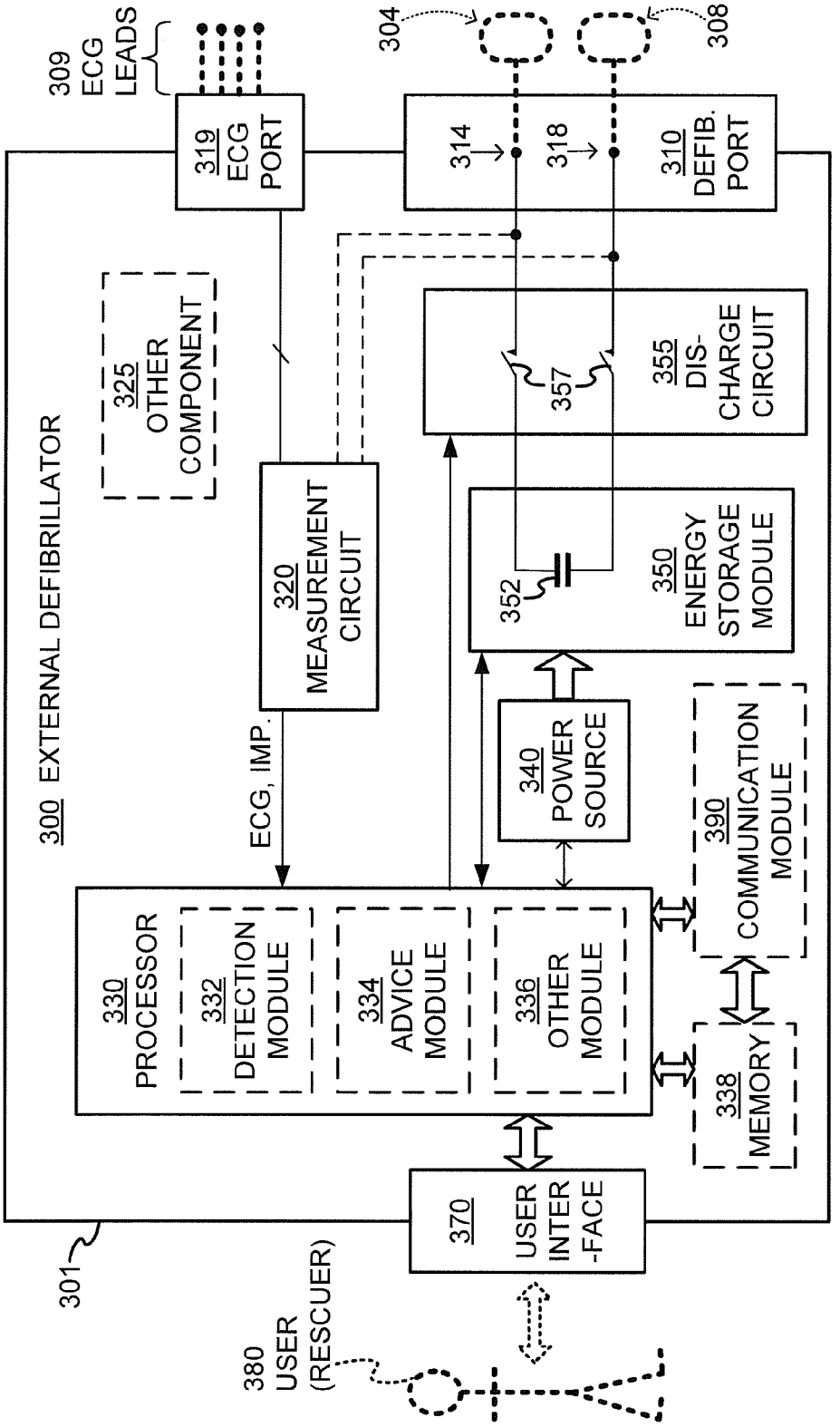


FIG. 3

COMPONENTS OF EXTERNAL DEFIBRILLATOR

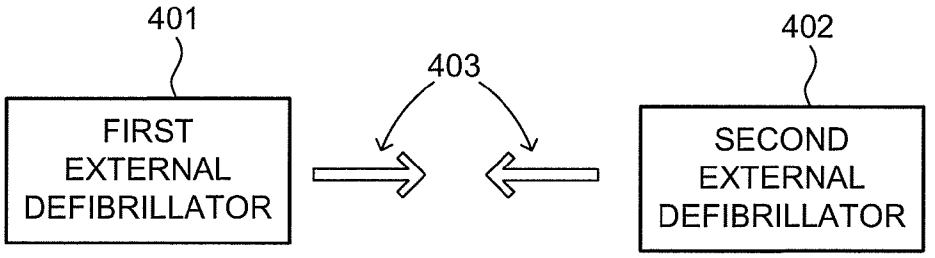
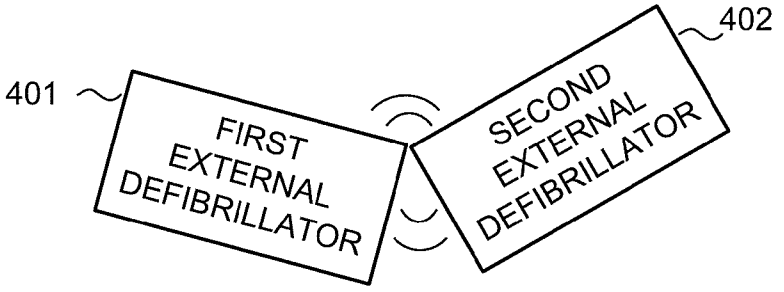


FIG. 4A

BEFORE BUMPING



BUMPING

FIG. 4B

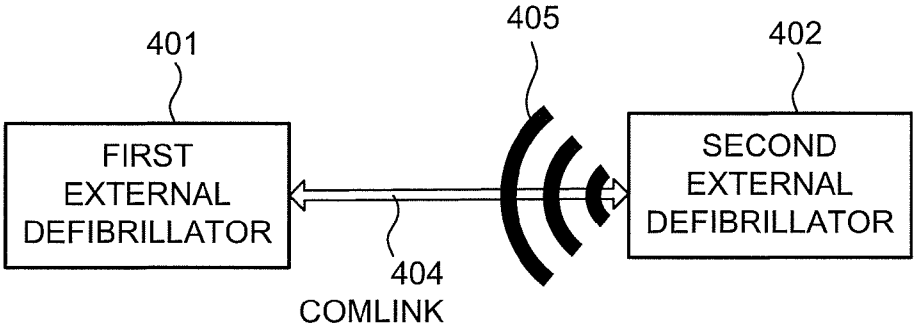
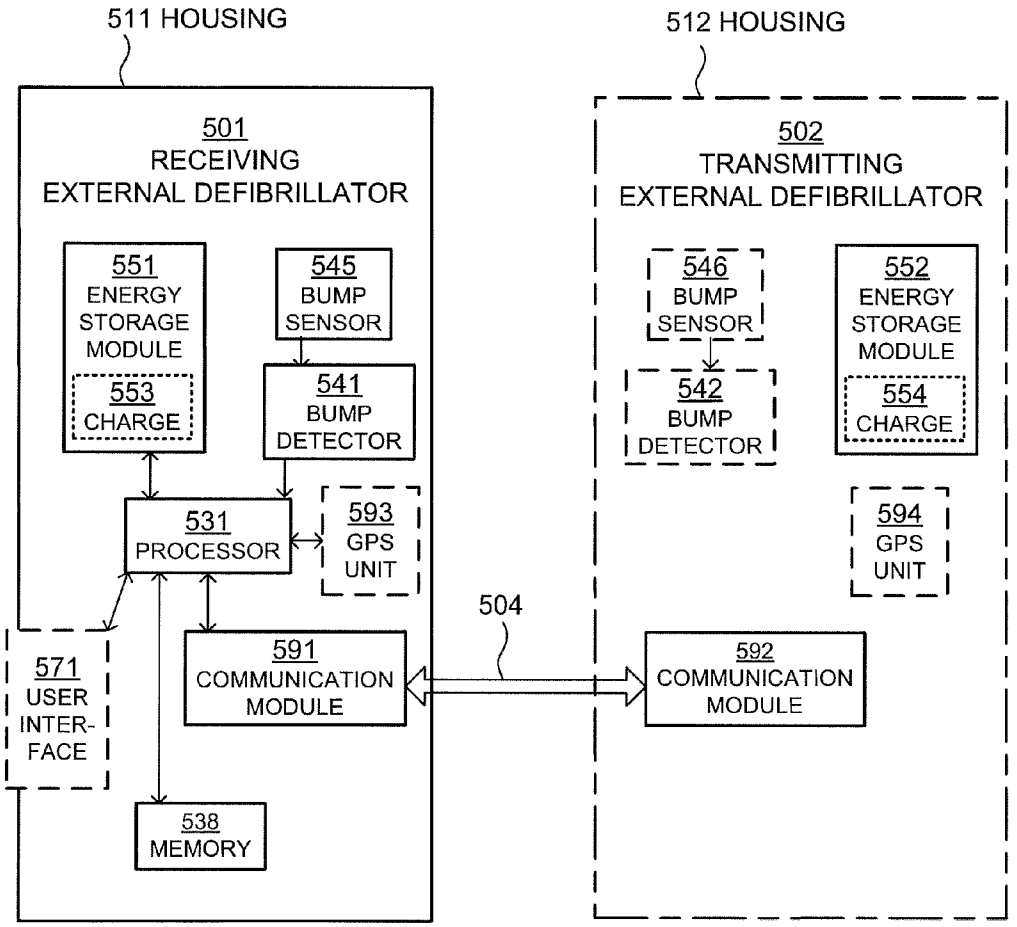


FIG. 4C

AFTER BUMPING: EVENT DATA TRANSFER



EXTERNAL DEFIBRILLATOR INITIATING RECEPTION OF EVENT DATA UPON BEING BUMPED

FIG. 5

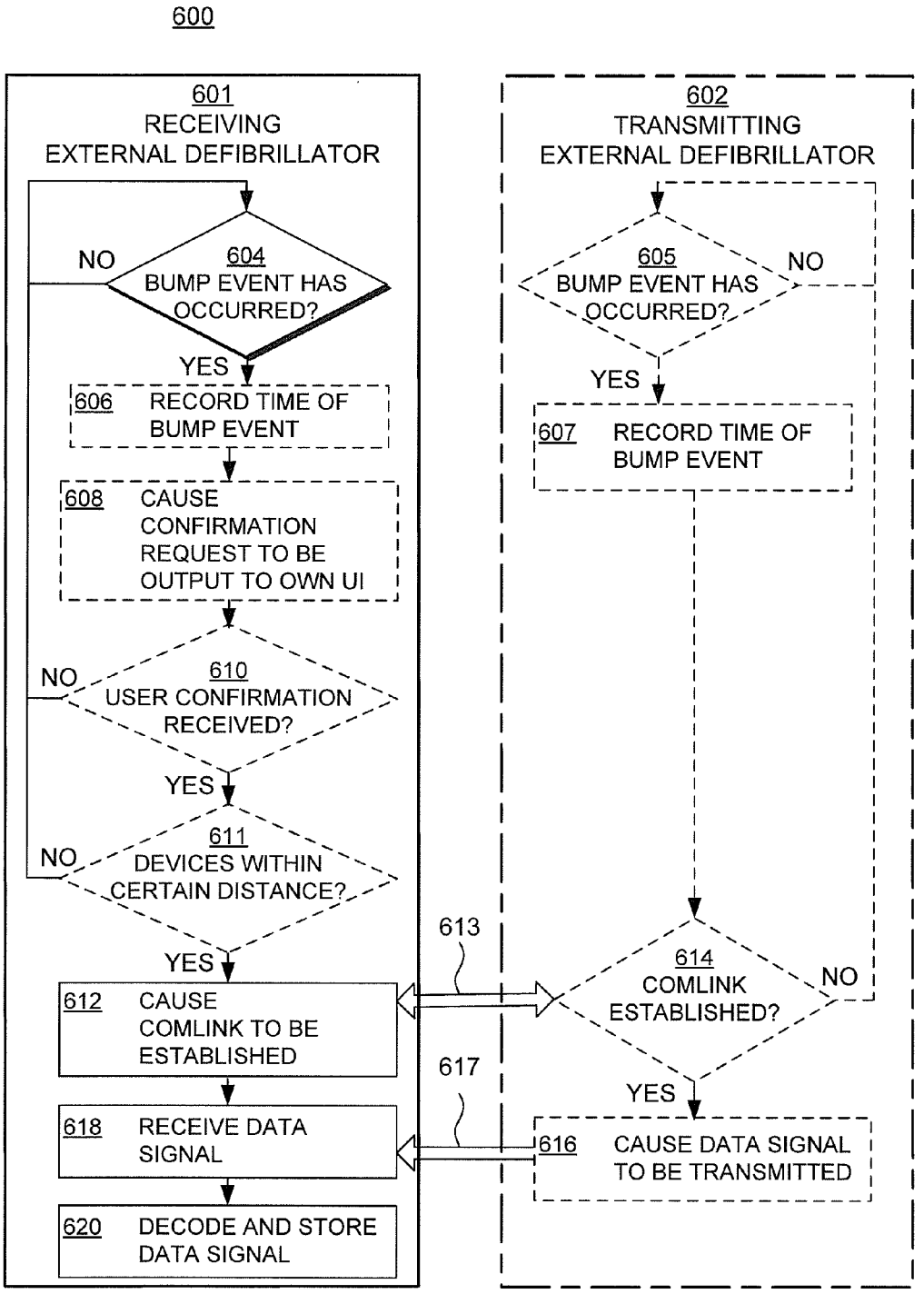


FIG. 6

METHODS OF EXTERNAL DEFIBRILLATOR RECEIVING EVENT DATA UPON BEING BUMPED

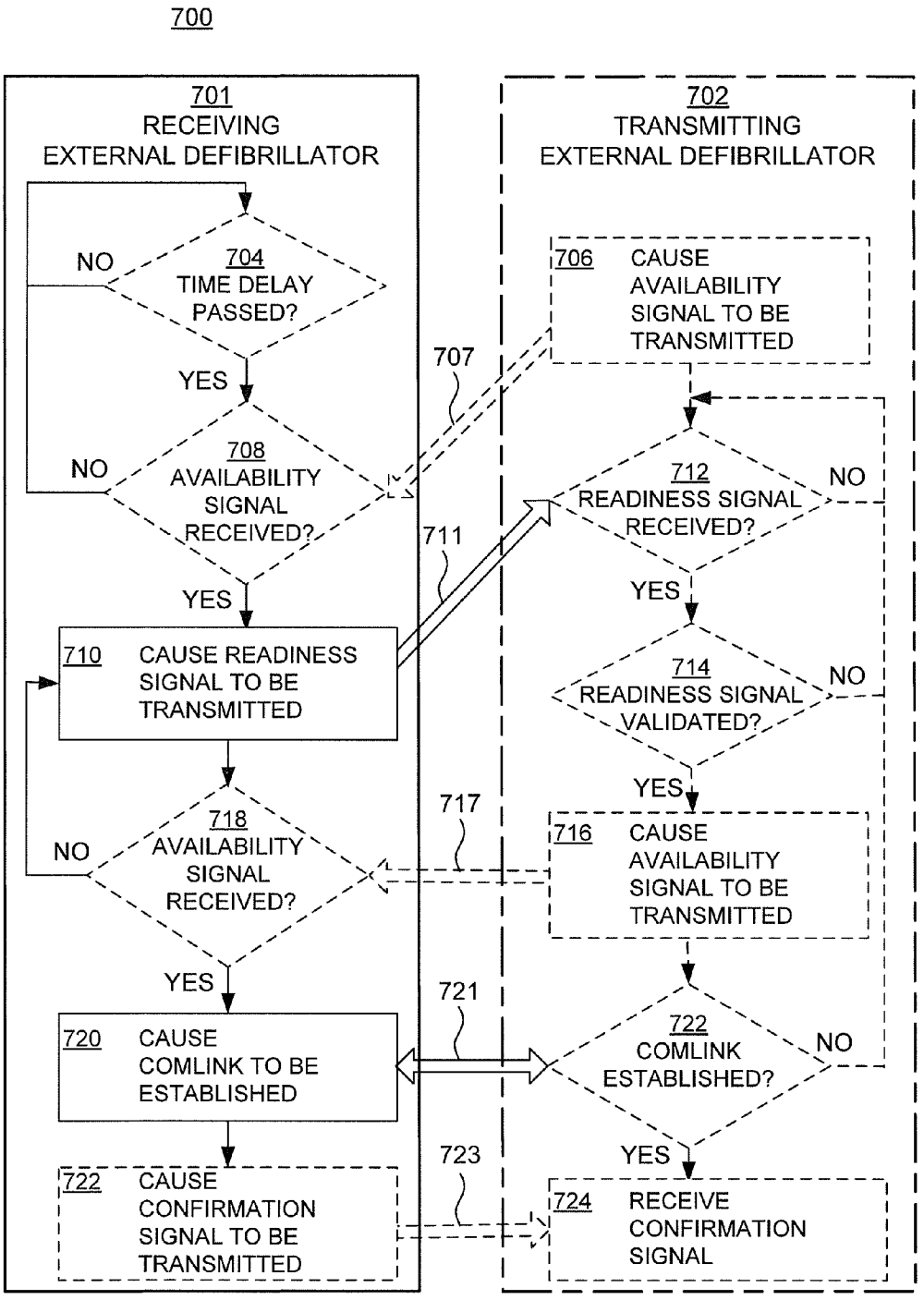
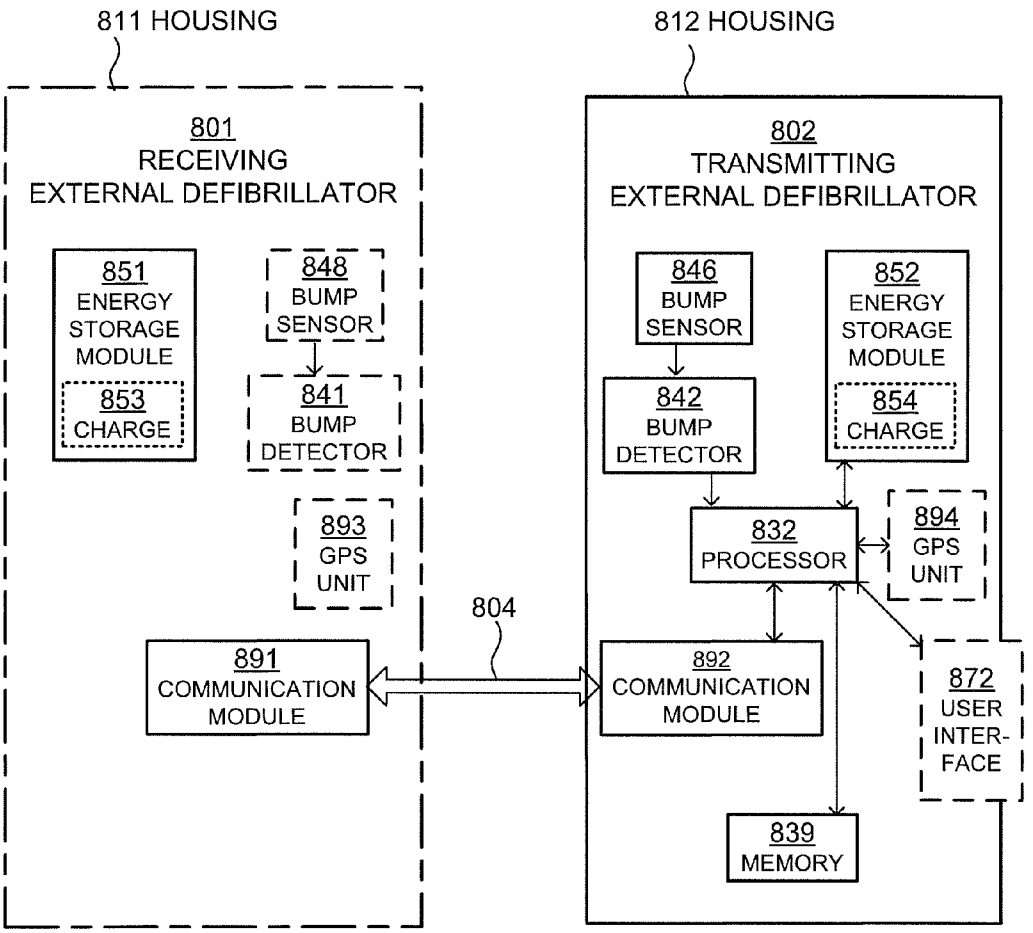


FIG. 7

METHODS OF ESTABLISHING COMMUNICATION LINK BETWEEN EXTERNAL DEFIBRILLATORS



EXTERNAL DEFIBRILLATOR INITIATING TRANSMISSION OF EVENT DATA UPON BEING BUMPED

FIG. 8

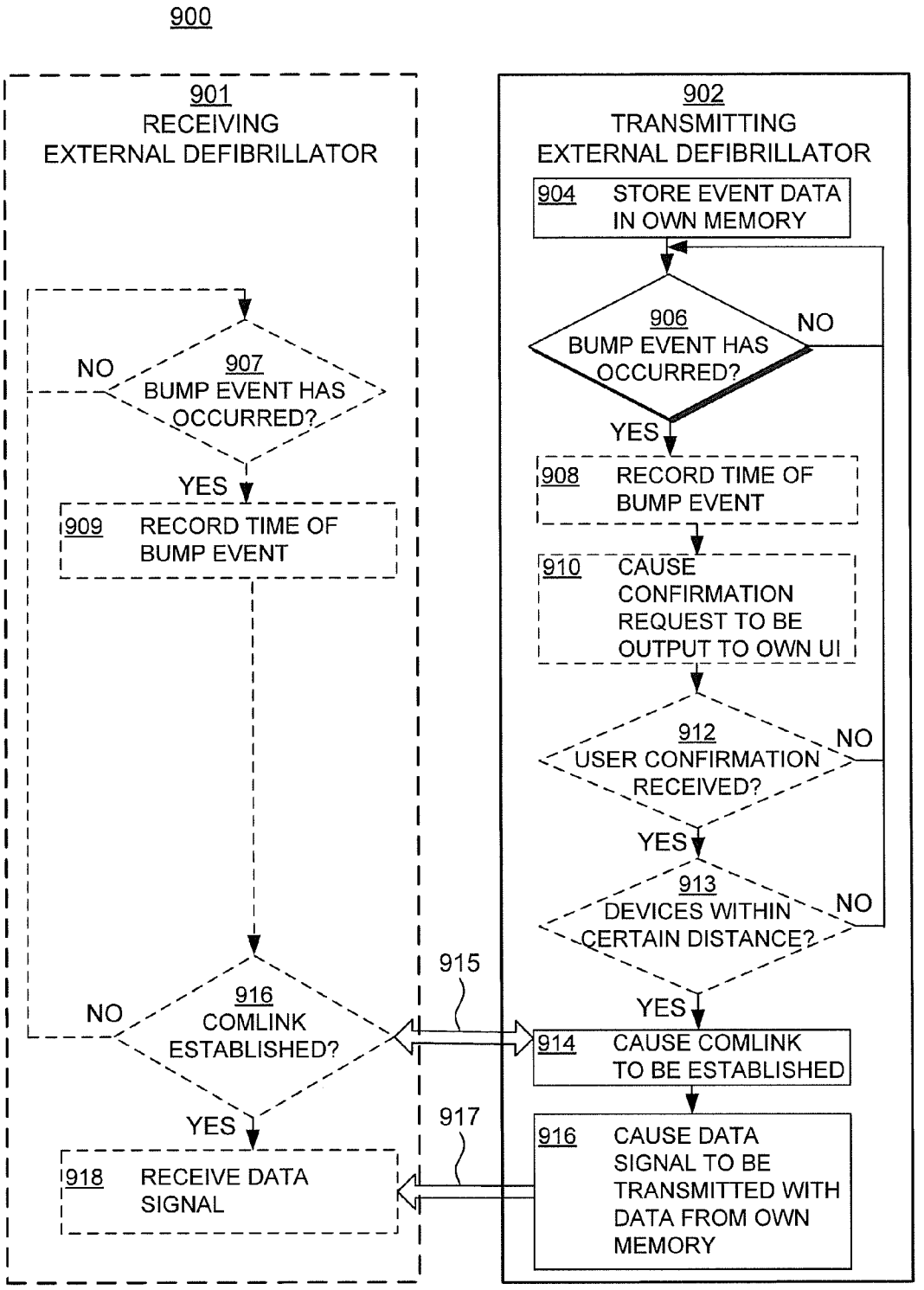


FIG. 9

METHODS OF EXTERNAL DEFIBRILLATOR TRANSMITTING EVENT DATA UPON BEING BUMPED

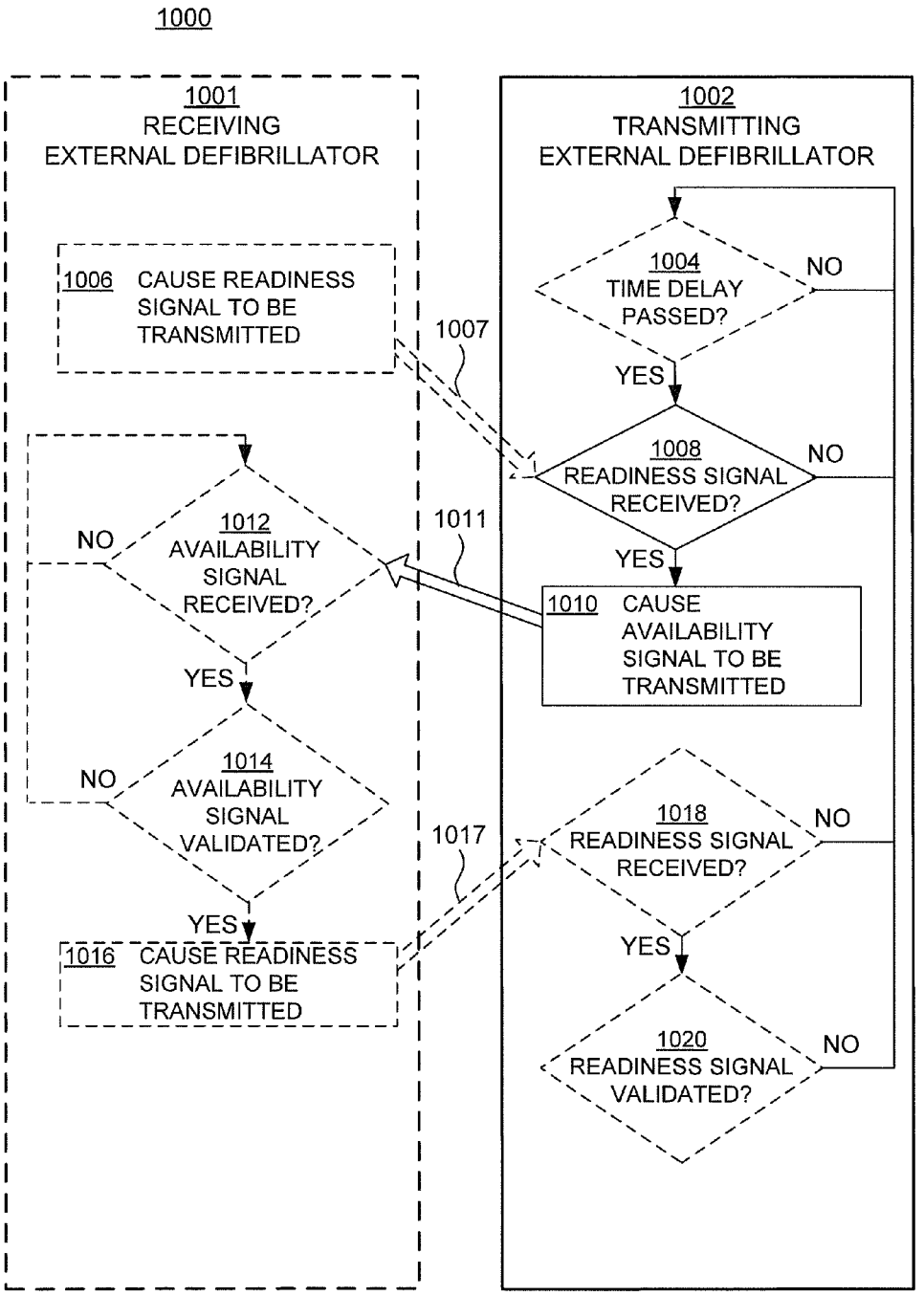


FIG. 10

METHODS OF ESTABLISHING COMMUNICATION LINK BETWEEN EXTERNAL DEFIBRILLATORS

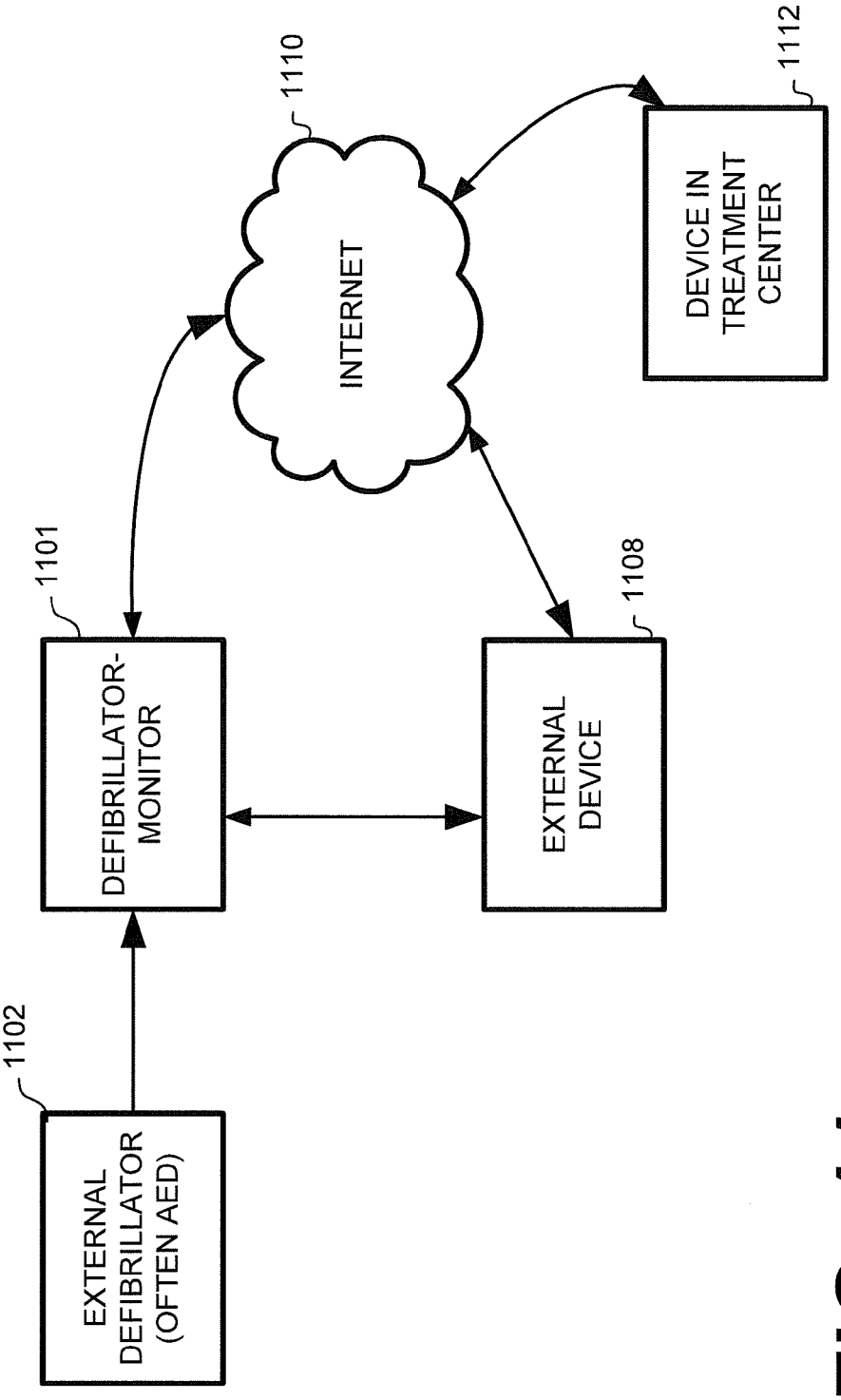

1102
EXTERNAL DEFIBRILLATOR (OFTEN AED)
1101
DEFIBRILLATOR-MONITOR
1108
EXTERNAL DEVICE
1110
INTERNET
1112
DEVICE IN TREATMENT CENTER
TRANSFERRING EVENT DATA

FIG. 11

MANUALLY INITIATING WIRELESS RECEPTION OF RESUSCITATION EVENT DATA FROM MEDICAL DEVICE

RELATIONSHIP WITH OTHER APPLICATIONS

[0001] This patent application claims priority from U.S.A. Provisional Patent Application Ser. No. 61/413,297, filed on Nov. 12, 2010, the disclosure of which is hereby incorporated by reference for all purposes.

[0002] This patent application may be found to be related to U.S.A. patent application Ser. No. [SER_NO_OF_7257-0039/P40442.02], entitled MANUALLY INITIATING WIRELESS TRANSMISSION OF RESUSCITATION EVENT DATA TO MEDICAL DEVICE, assigned to the same assignee, filed on the same day as the instant patent application.

FIELD

[0003] This invention generally relates to the field of medical devices such as defibrillators.

BACKGROUND

[0004] In humans, the heart beats to sustain life. In normal operation, it pumps blood through the various parts of the body. More particularly, the various chamber of the heart contract and expand in a periodic and coordinated fashion, which causes the blood to be pumped regularly. More specifically, the right atrium sends deoxygenated blood into the right ventricle. The right ventricle pumps the blood to the lungs, where it becomes oxygenated, and from where it returns to the left atrium. The left atrium pumps the oxygenated blood to the left ventricle. The left ventricle, then, expels the blood, forcing it to circulate to the various parts of the body.

[0005] The heart chambers pump because of the heart's electrical control system. More particularly, the sinoatrial (SA) node generates an electrical impulse, which generates further electrical signals. These further signals cause the above-described contractions of the various chambers in the heart, in the correct sequence. The electrical pattern created by the sinoatrial (SA) node is called a sinus rhythm.

[0006] Sometimes, however, the electrical control system of the heart malfunctions, which can cause the heart to beat irregularly, or not at all. The cardiac rhythm is then generally called an arrhythmia. Arrhythmias may be caused by electrical activity from locations in the heart other than the SA node. Some types of arrhythmia may result in inadequate blood flow, thus reducing the amount of blood pumped to the various parts of the body. Some arrhythmias may even result in a Sudden Cardiac Arrest (SCA). In a SCA, the heart fails to pump blood effectively, and, if not treated, death can occur. In fact, it is estimated that SCA results in more than 250,000 deaths per year in the United States alone. Further, a SCA may result from a condition other than an arrhythmia.

[0007] One type of arrhythmia associated with SCA is known as Ventricular Fibrillation (VF). VF is a type of malfunction where the ventricles make rapid, uncoordinated movements, instead of the normal contractions. When that happens, the heart does not pump enough blood to deliver enough oxygen to the vital organs. The person's condition will deteriorate rapidly and, if not reversed in time, they will die soon, e.g. within ten minutes.

[0008] Ventricular Fibrillation can often be reversed using a life-saving device called a defibrillator. A defibrillator, if applied properly, can administer an electrical shock to the heart. The shock may terminate the VF, thus giving the heart the opportunity to resume pumping blood. If VF is not terminated, the shock may be repeated, often at escalating energies.

[0009] A challenge with defibrillation is that the electrical shock must be administered very soon after the onset of VF. There is not much time: the survival rate of persons suffering from VF decreases by about 10% for each minute the administration of a defibrillation shock is delayed. After about 10 minutes the rate of survival for SCA victims averages less than 2%.

[0010] The challenge of defibrillating early after the onset of VF is being met in a number of ways. First, for some people who are considered to be at a higher risk of VF or other heart arrythmias, an Implantable Cardioverter Defibrillator (ICD) can be implanted surgically. An ICD can monitor the person's heart, and administer an electrical shock as needed. As such, an ICD reduces the need to have the higher-risk person be monitored constantly by medical personnel.

[0011] Regardless, VF can occur unpredictably, even to a person who is not considered at risk. As such, VF can be experienced by many people who lack the benefit of ICD therapy. When VF occurs to a person who does not have an ICD, they collapse, because blood flow has stopped. They should receive therapy quickly.

[0012] For a VF victim without an ICD, a different type of defibrillator can be used, which is called an external defibrillator. External defibrillators have been made portable, so they can be brought to a potential VF victim quickly enough to revive them.

[0013] During VF, the person's condition deteriorates, because the blood is not flowing to the brain, heart, lungs, and other organs. Blood flow must be restored, if resuscitation attempts are to be successful.

[0014] Cardiopulmonary Resuscitation (CPR) is one method of forcing blood flow in a person experiencing cardiac arrest. In addition, CPR is the primary recommended treatment for some patients with some kinds of non-VF cardiac arrest, such as asystole and pulseless electrical activity (PEA). CPR is a combination of techniques that include chest compressions to force blood circulation, and rescue breathing to force respiration.

[0015] Properly administered CPR provides oxygenated blood to critical organs of a person in cardiac arrest, thereby minimizing the deterioration that would otherwise occur. As such, CPR can be beneficial for persons experiencing VF, because it slows the deterioration that would otherwise occur while a defibrillator is being retrieved. Indeed, for patients with an extended down-time, survival rates are higher if CPR is administered prior to defibrillation.

[0016] Advanced medical devices can actually coach a rescuer who performs CPR. For example, a medical device can issue instructions, and even prompts, for the rescuer to perform CPR more effectively.

BRIEF SUMMARY

[0017] The present description gives instances of medical devices, software and methods, the use of which may help overcome problems and limitations of the prior art.

[0018] In some embodiments, a receiving external defibrillator having a housing may receive resuscitation event data from a transmitting external defibrillator. For example, a

bump sensor of the receiving external defibrillator may generate motion information of the housing and a bump detector may determine whether the housing has been subjected to a local bump event based on the generated motion information. Responsive to a determination that the local bump event has occurred, a processor of the receiving external defibrillator may cause communication modules of the external defibrillators to establish a wireless communication link. Once the communication link has been established, the receiving external defibrillator may wirelessly receive the resuscitation event data transmitted by the transmitting external defibrillator over the communication link.

[0019] An advantage over the prior art is that resuscitation event data may be transferred quickly, easily, and securely from a first external defibrillator to a second external defibrillator. Such data transfer may be performed independent of a user needing to physically establish a connection between the devices by plugging wires into either device, for example. Indeed, certain embodiments use only a local bump event to initiate a process that ultimately causes the data transfer to take place. As used herein, a bump event generally refers to a user causing one of the external defibrillators to physically bump the other external defibrillator.

[0020] These and other features and advantages of this description will become more readily apparent from the following Detailed Description, which proceeds with reference to the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. **1** is a diagram of a scene where an external defibrillator is used to save the life of a person according to embodiments.

[0022] FIG. **2** is a table listing two main types of the external defibrillator shown in FIG. **1**, and who they might be used by.

[0023] FIG. **3** is a functional block diagram showing components of an external defibrillator, such as the one shown in FIG. **1**, which is made according to embodiments.

[0024] FIG. **4**A is a diagram showing two external defibrillators before being bumped together according to embodiments.

[0025] FIG. **4**B is a diagram showing the two external defibrillators of FIG. **4**A being bumped together, according to embodiments.

[0026] FIG. **4**C is a diagram showing the two external defibrillators of FIG. **4**B establishing a communication link, after having been bumped together according to embodiments.

[0027] FIG. **5** is a block diagram showing components of an external defibrillator initiating reception of event data upon being bumped according to embodiments.

[0028] FIG. **6** is a flowchart for illustrating example methods executable by external defibrillators according to embodiments.

[0029] FIG. **7** is a flowchart for illustrating example methods executable by external defibrillators according to embodiments.

[0030] FIG. **8** is a block diagram showing components of an external defibrillator initiating transmission of event data upon being bumped according to embodiments.

[0031] FIG. **9** is a flowchart for illustrating example methods executable by external defibrillators according to embodiments.

[0032] FIG. **10** is a flowchart for illustrating example methods executable by external defibrillators according to embodiments.

[0033] FIG. **11** is a block diagram showing systems for transferring event data that include an external defibrillator and a defibrillator-monitor according to embodiments.

DETAILED DESCRIPTION

[0034] FIG. **1** is a diagram of a defibrillation scene. A person **82** is lying on their back. Person **82** could be a patient in a hospital, or someone found unconscious, and then turned to be on their back. Person **82** is experiencing a condition in their heart **85**, which could be Ventricular Fibrillation (VF).

[0035] A portable external defibrillator **100** has been brought close to person **82**. At least two defibrillation electrodes **104**, **108** are usually provided with external defibrillator **100**, and are sometimes called electrodes **104**, **108**. Electrodes **104**, **108** are coupled with external defibrillator **100** via respective electrode leads **105**, **109**. A rescuer (not shown) has attached electrodes **104**, **108** to the skin of person **82**. Defibrillator **100** is administering, via electrodes **104**, **108**, a brief, strong electric pulse **111** through the body of person **82**. Pulse **111**, also known as a defibrillation shock, goes also through heart **85**, in an attempt to restart it, for saving the life of person **82**.

[0036] Defibrillator **100** can be one of different types, each with different sets of features and capabilities. The set of capabilities of defibrillator **100** is determined by planning who would use it, and what training they would be likely to have. Examples are now described.

[0037] FIG. **2** is a table listing two main types of external defibrillators, and who they are primarily intended to be used by. A first type of defibrillator **100** is generally called a defibrillator-monitor, because it is typically formed as a single unit in combination with a patient monitor. A defibrillator-monitor is sometimes called monitor-defibrillator. A defibrillator-monitor is intended to be used by persons in the medical professions, such as doctors, nurses, paramedics, emergency medical technicians, etc. Such a defibrillator-monitor is intended to be used in a pre-hospital or hospital scenario.

[0038] As a defibrillator, the device can be one of different varieties, or even versatile enough to be able to switch among different modes that individually correspond to the varieties. One variety is that of an automated defibrillator, which can determine whether a shock is needed and, if so, charge to a predetermined energy level and instruct the user to administer the shock. Another variety is that of a manual defibrillator, where the user determines the need and controls administering the shock.

[0039] As a patient monitor, the device has features additional to what is minimally needed for mere operation as a defibrillator. These features can be for monitoring physiological indicators of a person in an emergency scenario. These physiological indicators are typically monitored as signals. For example, these signals can include a person's full ECG (electrocardiogram) signals, or impedance between two electrodes. Additionally, these signals can be about the person's temperature, non-invasive blood pressure (NIBP), arterial oxygen saturation/pulse oximetry (SpO2), the concentration or partial pressure of carbon dioxide in the respiratory gases, which is also known as capnography, and so on. These signals can be further stored and/or transmitted as patient data.

[0040] A second type of external defibrillator **100** is generally called an AED, which stands for "Automated External Defibrillator". An AED typically makes the shock/no shock determination by itself, automatically. Indeed, it can sense enough physiological conditions of the person **82** via only the shown defibrillation electrodes **104**, **108** of FIG. **1**. In its present embodiments, an AED can either administer the shock automatically, or instruct the user to do so, e.g. by pushing a button. Being of a much simpler construction, an AED typically costs much less than a defibrillator-monitor. As such, it makes sense for a hospital, for example, to deploy AEDs at its various floors, in case the more expensive defibrillator-monitor is more critically being deployed at an Intensive Care Unit, and so on.

[0041] AEDs, however, can also be used by people who are not in the medical profession. More particularly, an AED can be used by many professional first responders, such as policemen, firemen, etc. Even a person with only first-aid training can use one. And AEDs increasingly can supply instructions to whoever is using them.

[0042] AEDs are thus particularly useful, because it is so critical to respond quickly, when a person suffers from VF. Indeed, the people who will first reach the VF sufferer may not be in the medical professions.

[0043] Increasing awareness has resulted in AEDs being deployed in public or semi-public spaces, so that even a member of the public can use one, if they have obtained first aid and CPR/AED training on their own initiative. This way, defibrillation can be administered soon enough after the onset of VF, to hopefully be effective in rescuing the person.

[0044] There are additional types of external defibrillators, which are not listed in FIG. **2**. For example, a hybrid defibrillator can have aspects of an AED, and also of a defibrillator-monitor. A usual such aspect is additional ECG monitoring capability.

[0045] FIG. **3** is a diagram showing components of an external defibrillator **300** made according to embodiments. These components can be, for example, in external defibrillator **100** of FIG. **1**. Plus, these components of FIG. **3** can be provided in a housing **301**, which is also known as casing **301**.

[0046] External defibrillator **300** is intended for use by a user **380**, who would be the rescuer. Defibrillator **300** typically includes a defibrillation port **310**, such as a socket in housing **301**. Defibrillation port **310** includes nodes **314**, **318**. Defibrillation electrodes **304**, **308**, which can be similar to electrodes **104**, **108**, can be plugged in defibrillation port **310**, so as to make electrical contact with nodes **314**, **318**, respectively. It is also possible that electrodes can be connected continuously to defibrillation port **310**, etc. Either way, defibrillation port **310** can be used for guiding via electrodes to person **82** an electrical charge that has been stored in defibrillator **300**, as will be seen later in this document.

[0047] If defibrillator **300** is actually a defibrillator-monitor, as was described with reference to FIG. **2**, then it will typically also have an ECG port **319** in housing **301**, for plugging in ECG leads **309**. ECG leads **309** can help sense an ECG signal, e.g. a **12**-*lead* signal, or from a different number of leads. Moreover, a defibrillator-monitor could have additional ports (not shown), and an other component **325** for the above described additional features, such as patient signals.

[0048] Defibrillator **300** also includes a measurement circuit **320**. Measurement circuit **320** receives physiological signals from ECG port **319**, and also from other ports, if provided. These physiological signals are sensed, and information about them is rendered by circuit **320** as data, or other signals, etc.

[0049] If defibrillator **300** is actually an AED, it may lack ECG port **319**. Measurement circuit **320** can obtain physiological signals through nodes **314**, **318** instead, when defibrillation electrodes **304**, **308** are attached to person **82**. In these cases, a person's ECG signal can be sensed as a voltage difference between electrodes **304**, **308**. Plus, impedance between electrodes **304**, **308** can be sensed for detecting, among other things, whether these electrodes **304**, **308** have been inadvertently disconnected from the person.

[0050] Defibrillator **300** also includes a processor **330**. Processor **330** may be implemented in any number of ways. Such ways include, by way of example and not of limitation, digital and/or analog processors such as microprocessors and digital-signal processors (DSPs); controllers such as microcontrollers; software running in a machine; programmable circuits such as Field Programmable Gate Arrays (I-PGAs), Field-Programmable Analog Arrays (FPAAs), Programmable Logic Devices (PLDs), Application Specific Integrated Circuits (ASICs), any combination of one or more of these, and so on.

[0051] Processor **330** can be considered to have a number of modules. One such module can be a detection module **332**, which senses outputs of measurement circuit **320**. Detection module **332** can include a VF detector. Thus, the person's sensed ECG can be used to determine whether the person is experiencing VF.

[0052] Another such module in processor **330** can be an advice module **334**, which arrives at advice based on outputs of detection module **332**. Advice module **334** can include a Shock Advisory Algorithm, implement decision rules, and so on. The advice can be to shock, to not shock, to administer other forms of therapy, and so on. If the advice is to shock, some external defibrillator embodiments merely report that to the user, and prompt them to do it. Other embodiments further execute the advice, by administering the shock. If the advice is to administer CPR, defibrillator **300** may further issue prompts for it, and so on.

[0053] Processor **330** can include additional modules, such as module **336**, for other functions. In addition, if other component **325** is indeed provided, it may be operated in part by processor **330**, etc.

[0054] Defibrillator **300** optionally further includes a memory **338**, which can work together with processor **330**. Memory **338** may be implemented in any number of ways. Such ways include, by way of example and not of limitation, nonvolatile memories (NVM), read-only memories (ROM), random access memories (RAM), any combination of these, and so on. Memory **338**, if provided, can include programs for processor **330**, and so on. The programs can be operational for the inherent needs of processor **330**, and can also include protocols and ways that decisions can be made by advice module **334**. In addition, memory **338** can store prompts for user **380**, etc. Moreover, memory **338** can store patient data.

[0055] Defibrillator **300** may also include a power source **340**. To enable portability of defibrillator **300**, power source **340** typically includes a battery. Such a battery is typically implemented as a battery pack, which can be rechargeable or not. Sometimes, a combination is used, of rechargeable and non-rechargeable battery packs. Other embodiments of power source **340** can include AC power override, for where

AC power will be available, and so on. In some embodiments, power source **340** is controlled by processor **330**.

[0056] Defibrillator **300** additionally includes an energy storage module **350**. Module **350** is where some electrical energy is stored, when preparing it for sudden discharge to administer a shock. Module **350** can be charged from power source **340** to the right amount of energy, as controlled by processor **330**. In typical implementations, module **350** includes one or more capacitors **352**, and so on.

[0057] Defibrillator **300** moreover includes a discharge circuit **355**. Circuit **355** can be controlled to permit the energy stored in module **350** to be discharged to nodes **314**, **318**, and thus also to defibrillation electrodes **304**, **308**. Circuit **355** can include one or more switches **357**. Those can be made in a number of ways, such as by an H-bridge, and so on.

[0058] Defibrillator **300** further includes a user interface **370** for user **380**. User interface **370** can be made in any number of ways. For example, interface **370** may include a screen, to display what is detected and measured, provide visual feedback to the rescuer for their resuscitation attempts, and so on. Interface **370** may also include a speaker, to issue voice prompts, etc. Interface **370** may additionally include various controls, such as pushbuttons, keyboards, and so on. In addition, discharge circuit **355** can be controlled by processor **330**, or directly by user **380** via user interface **370**, and so on.

[0059] Defibrillator **300** can optionally include other components. For example, a communication module **390** may be provided for communicating with other machines. Such communication can be performed wirelessly, or via wire, or by infrared communication, and so on. This way, data can be communicated, such as patient data, incident information, therapy attempted, CPR performance, and so on.

[0060] FIGS. **4**A-**4**C illustrate interactions between a first external defibrillator **401** and a second external defibrillator **402**, such as the external defibrillator **300** of FIG. **3**, according to embodiments.

[0061] FIG. **4**A is a diagram showing the two external defibrillators **401** and **402** before being bumped together according to embodiments. The two external defibrillators **401** and **402** may approach each other as indicated by arrows **403**. For example, a user may move the first external defibrillator **401** toward the second external defibrillator **402**. Alternatively or in addition thereto, the user or another user may move the second external defibrillator **402** toward the first external defibrillator **401**.

[0062] FIG. **4**B is a diagram showing the two external defibrillators **401** and **402** of FIG. **4**A being bumped together, according to embodiments. For example, a user may move the first external defibrillator **401** toward the second external defibrillator **402** until a physical contact between the two devices occurs. Alternatively or in additional thereto, the user or another user may move the second external defibrillator **402** toward the first external defibrillator **401** until the two devices physically contact each other.

[0063] FIG. **4**C is a diagram showing the two external defibrillators **401** and **402** of FIG. **4**B establishing a communication link ("comlink") **404**, after having been bumped together according to embodiments. The comlink **404** is bidirectional, as indicated in the diagram. In certain embodiments, the second external defibrillator **402** may subsequently transmit a data signal to the first external defibrillator **401**, as indicated by **405**. The comlink **404** may be wireless and, consequently, the data signal transmission **405** may also be wireless. The data signal may encode event data that the first external defibrillator **401** may decode subsequent to receiving the data signal from the second external defibrillator **402**.

[0064] FIG. **5** is a block diagram showing components of a receiving external defibrillator **501**, such as the first external defibrillator **401** of FIGS. **4**A-**4**C, initiating reception of event data upon being bumped according to embodiments. In certain embodiments, the receiving external defibrillator **501** receives resuscitation event data from a transmitting external defibrillator **502** that is distinct from the receiving external defibrillator **501**.

[0065] The receiving external defibrillator **501** includes a first housing **511**, a first energy storage module **551** in an interior of the first housing **511** for storing a first electrical charge **553**, a first defibrillation port (not shown) for guiding via electrodes the first electrical charge **553** to the person, and a first wireless communication module **591**.

[0066] The transmitting external defibrillator **502** includes a second housing **512**, a second energy storage module **552** in the second housing **512** for storing a second electrical charge **554**, a second defibrillation port (not shown) for guiding via electrodes the second electrical charge **554** to a person, and a second wireless communication module **592**.

[0067] The receiving external defibrillator **501** includes a bump sensor **545** in the interior of the first housing **511**, for generating motion information of the first housing **511**, and a bump detector **541** configured to determine whether the first housing **511** of the receiving external defibrillator **501** has been subjected to a local bump event based on the generated motion information. In certain embodiments, a local bump event is determined to have occurred if the motion information is interpreted as a deceleration event with a value larger than a preset threshold. The transmitting external defibrillator **502** may optionally include a bump sensor **546** in the interior of the second housing **512**, and a bump detector **542**.

[0068] The receiving external defibrillator **501** includes a processor **531** configured to, responsive to a determination that a local bump event has occurred, cause the first communication module **592** to establish a wireless communication link **504** with the second communication module **592**, the first communication module **591** being further adapted to receive wirelessly a data signal transmitted by the second communication module **592** over the communication link **504**, the data signal encoding event data stored in the transmitting external defibrillator **502** about when the second electrical charge **554** was guided to the person. In certain embodiments, the receiving external defibrillator **501** also includes a memory **538** adapted to store the resuscitation event data after being received and decoded from the data signal.

[0069] The receiving external defibrillator **501** may optionally include a user interface **571**. In such embodiments, a confirmation request may be caused to be output via the user interface **571** responsive to the determination that the local bump event has occurred. Also, the communication link **504** may be caused to be established responsive to receiving by a user a user confirmation in response to the confirmation request.

[0070] In certain embodiments, establishing the communication link **504** includes causing the first communication module **591** to transmit a readiness signal, and the data signal is transmitted by the second communication module **592** responsive to receiving the readiness signal. The readiness

signal may communicate identification information about the receiving external defibrillator **501**, for example.

[0071] In certain embodiments, establishing the communication link **504** includes receiving an availability signal that is generated by the transmitting external defibrillator **502**. The availability signal may communicate identification information about the transmitting external defibrillator **502**, for example.

[0072] In certain embodiments, establishing the communication link **504** includes establishing a bump confirmation that the local bump event also involved the transmitting external defibrillator **502**, and the data signal is received only if the local bump confirmation is established. In some of these embodiments, establishing the communication link **504** further includes causing the first communication module **591** to transmit a readiness signal. The readiness signal may be output with either a preset time delay after a time of the local bump event or a randomized time delay within a preset time after the local bump event. The readiness signal may encode a time indication associated with the occurrence of the local bump event.

[0073] In certain embodiments, establishing the communication link **504** further includes receiving an availability signal that is generated by the transmitting external defibrillator **502**, a time of a remote bump event of the transmitting external defibrillator **502** is determined from the availability signal, and the bump confirmation is established by comparing the time of the remote bump event with a time of the local bump event. For the time comparison, the availability signal may be presumed output with a preset time delay after a time of the remote bump event. The availability signal may encode the time indication of the remote bump event.

[0074] The receiving external defibrillator **501** may optionally include a first global positioning system (GPS) unit **593**. The first GPS unit **593** may be configured to determine first GPS coordinates corresponding to the receiving external defibrillator **501**. In certain embodiments, the transmitting external defibrillator **502** has a second GPS unit **594** configured to determine second GPS coordinates corresponding to the transmitting external defibrillator **502**. In such embodiments, the communication link **504** may not be established unless or until the two devices are within a certain distance of each other as determined by comparing the first GPS coordinates and the second GPS coordinates. The determination may take into account a margin of error depending on the type of each GPS unit **593** and **594**.

[0075] FIG. **8** is a block diagram showing components of a transmitting external defibrillator **802**, such as the second external defibrillator **402** of FIGS. **4**A-**4**C, initiating transmission of event data upon being bumped according to embodiments. In certain embodiments, the transmitting external defibrillator **802** transmits resuscitation event data to a receiving external defibrillator **801** that is distinct from the transmitting external defibrillator **802**.

[0076] The receiving external defibrillator **801** includes a first housing **811**, a first energy storage module **851** in the first housing **811** for storing a first electrical charge **853**, a first defibrillation port (not shown) for guiding via electrodes the first electrical charge **853** to a person, and a first wireless communication module **891**. In certain embodiments, the receiving external defibrillator **801** also includes a first GPS unit **893** configured to determine first GPS coordinates corresponding to the receiving external defibrillator **801**.

[0077] The transmitting external defibrillator **802** includes a second housing **812**, a second energy storage module **852** in an interior of the second housing **812** for storing a second electrical charge **854**, a second defibrillation port (not shown) for guiding via electrodes the second electrical charge **854** to the person, and a second wireless communication module **892**.

[0078] The transmitting external defibrillator **802** also includes a bump sensor **846** in the interior of the second housing **812**, for generating motion information of the second housing **812**, and a bump detector **842** configured to determine whether the second housing **812** of the transmitting external defibrillator **802** has been subjected to a local bump event based on the generated motion information. In certain embodiments, a local bump event is determined to have occurred if the motion information is interpreted as a deceleration event with a value larger than a preset threshold. The receiving external defibrillator **801** may optionally include a bump sensor **848** in the interior of the first housing **811**, and a bump detector **841**.

[0079] The transmitting external defibrillator **802** includes a processor **832** configured to, responsive to a determination that a local bump event has occurred, cause the second communication module **892** to establish a wireless communication link **804** with the first communication module **891**, the second communication module **892** being further adapted to transmit a data signal that encodes the resuscitation event data over the communication link **804**. In certain embodiments, the transmitting external defibrillator **802** also includes a memory **839** adapted to store event data about when the second electrical charge **854** was guided to the person.

[0080] The transmitting external defibrillator **802** may optionally include a user interface **872**. In such embodiments, a confirmation request may be caused to be output via the user interface **872** responsive to the determination that the local bump event has occurred. Also, the communication link **804** may be caused to be established responsive to receiving by a user a user confirmation in response to the confirmation request.

[0081] In certain embodiments, establishing the communication link **804** includes causing the second communication module **892** to transmit an availability signal, and the data signal is transmitted by the second communication module **892** responsive to the first communication module **891** receiving the availability signal. In certain embodiments, the availability signal communicates identification information about the transmitting external defibrillator **802**.

[0082] In certain embodiments, establishing the communication link **804** includes receiving a readiness signal that is generated by the receiving external defibrillator **801**. The readiness signal may communicate identification information about the receiving external defibrillator **801**, for example.

[0083] In certain embodiments, establishing the communication link **804** includes establishing a bump confirmation that the local bump event also involved the receiving external defibrillator **801**, and the data signal is transmitted only if the local bump confirmation is established. In some of these embodiments, establishing the communication link **804** further includes causing the second communication module **892** to transmit an availability signal. The availability signal may be output with either a preset time delay after a time of the local bump event or a randomized time delay within a preset

time after the local bump event. The availability signal may encode a time indication associated with the occurrence of the local bump event.

[0084] In certain embodiments, establishing the communication link **804** further includes receiving a readiness signal that is generated by the receiving external defibrillator **801**, a time of a remote bump event of the receiving external defibrillator **801** is determined from the readiness signal, and the bump confirmation is established by comparing the time of the remote bump event with a time of the local bump event. For the time comparison, the readiness signal may be presumed output with a preset time delay after a time of the remote bump event. The readiness signal may encode the time indication of the remote bump event.

[0085] The transmitting external defibrillator **802** may optionally include a second GPS unit **893**. The second GPS unit **893** may be configured to determine second GPS coordinates corresponding to the transmitting external defibrillator **802**. In certain embodiments, the transmitting external defibrillator **802** has a second GPS unit **894** configured to determine second GPS coordinates corresponding to the transmitting external defibrillator **802**. In such embodiments, the communication link **804** may not be established unless or until the two devices are within a certain distance of each other as determined by comparing the first GPS coordinates and the second GPS coordinates. The determination may take into account a margin of error depending on the type of each GPS unit **893** and **894**.

[0086] FIG. **11** is a block diagram showing systems for transferring event data that include an external defibrillator **1102** and a defibrillator-monitor **1101** according to embodiments. The external defibrillator **1102** is often an Automated External Defibrillator (AED). In certain embodiments, a user may cause a transfer of data such as resuscitation event data pertaining to a person, for example, between the external defibrillator **1102** and the defibrillator-monitor **1101** by bumping the external defibrillator **1102** into the defibrillator-monitor **1101**.

[0087] In certain embodiments, a data signal encoding resuscitation event data, for example, may be transferred from the defibrillator-monitor **1101** directly to an other external device **1108**, or to a remote device **1112**, such as in a treatment center, by way of a communication network **1110** such as the Internet. The other external device **1108** may also communicate with the remote device **1112** or with other devices not shown by way of the network **1110**.

[0088] The functions of this description may be implemented by one or more devices that include logic circuitry. The device performs functions and/or methods as are described in this document. The logic circuitry may include a processor that may be programmable for a general purpose, or dedicated, such as microcontroller, a microprocessor, a Digital Signal Processor (DSP), etc. For example, the device may be a digital computer like device, such as a general-purpose computer selectively activated or reconfigured by a computer program stored in the computer. Alternately, the device may be implemented by an Application Specific Integrated Circuit (ASIC), etc.

[0089] Moreover, methods are described below. The methods and algorithms presented herein are not necessarily inherently associated with any particular computer or other apparatus. Rather, various general-purpose machines may be used with programs in accordance with the teachings herein, or it may prove more convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these machines will become apparent from this description.

[0090] In all cases there should be borne in mind the distinction between methods in this description, and the method of operating a computing machine. This description relates both to methods in general, and also to steps for operating a computer and for processing electrical or other physical signals to generate other desired physical signals.

[0091] Programs are additionally included in this description, as are methods of operation of the programs. A program is generally defined as a group of steps leading to a desired result, due to their nature and their sequence. A program is usually advantageously implemented as a program for a computing machine, such as a general-purpose computer, a special purpose computer, a microprocessor, etc.

[0092] Storage media are additionally included in this description. Such media, individually or in combination with others, have stored thereon instructions of a program made according to the invention. A storage medium according to the invention is a computer-readable medium, such as a memory, and is read by the computing machine mentioned above.

[0093] Performing the steps or instructions of a program requires physical manipulations of physical quantities. Usually, though not necessarily, these quantities may be transferred, combined, compared, and otherwise manipulated or processed according to the instructions, and they may also be stored in a computer-readable medium. These quantities include, for example electrical, magnetic, and electromagnetic signals, and also states of matter that can be queried by such signals. It is convenient at times, principally for reasons of common usage, to refer to these quantities as bits, data bits, samples, values, symbols, characters, images, terms, numbers, or the like. It should be borne in mind, however, that all of these and similar terms are associated with the appropriate physical quantities, and that these terms are merely convenient labels applied to these physical quantities, individually or in groups.

[0094] This detailed description is presented largely in terms of flowcharts, display images, algorithms, and symbolic representations of operations of data bits within at least one computer readable medium, such as a memory. Indeed, such descriptions and representations are the type of convenient labels used by those skilled in programming and/or the data processing arts to effectively convey the substance of their work to others skilled in the art. A person skilled in the art of programming may use these descriptions to readily generate specific instructions for implementing a program according to the present invention.

[0095] Often, for the sake of convenience only, it is preferred to implement and describe a program as various interconnected distinct software modules or features, individually and collectively also known as software. This is not necessary, however, and there may be cases where modules are equivalently aggregated into a single program with unclear boundaries. In any event, the software modules or features of this description may be implemented by themselves, or in combination with others. Even though it is said that the program may be stored in a computer-readable medium, it should be clear to a person skilled in the art that it need not be a single memory, or even a single machine. Various portions, modules or features of it may reside in separate memories, or even separate machines. The separate machines may be connected

directly, or through a network, such as a local access network (LAN), or a global network, such as the Internet.

[0096] It will be appreciated that some of these methods may include software steps that may be performed by different modules of an overall software architecture. For example, data forwarding in a router may be performed in a data plane, which consults a local routing table. Collection of performance data may also be performed in a data plane. The performance data may be processed in a control plane, which accordingly may update the local routing table, in addition to neighboring ones. A person skilled in the art will discern which step is best performed in which plane.

[0097] An economy is achieved in the present document in that a single set of flowcharts is used to describe both programs, and also methods. So, while flowcharts are described in terms of boxes, they can mean both method and programs.

[0098] For this description, the methods may be implemented by machine operations. In other words, embodiments of programs are made such that they perform methods of the invention that are described in this document. These may be optionally performed in conjunction with one or more human operators performing some, but not all of them. As per the above, the users need not be collocated with each other, but each only with a machine that houses a portion of the program. Alternately, some of these machines may operate automatically, without users and/or independently from each other.

[0099] Methods are now described.

[0100] FIG. **6** is a flowchart for illustrating methods **600** executable by external defibrillators according to embodiments. In an operation at **604**, a receiving external defibrillator **601**, such as the receiving external defibrillator **501** of FIG. **5**, determines whether a local bump event has occurred. Responsive to a determination that the local bump event has occurred, the method **600** proceeds beyond the operation at **604**; otherwise, the operation at **604** repeats. Responsive to the determination that the local bump event has occurred, the receiving external defibrillator **601** may optionally record a time of the local bump event, as indicated by **606**.

[0101] In certain embodiments, a transmitting external defibrillator **602**, such as the transmitting external defibrillator **502** of FIG. **5**, also determines whether the local bump event has occurred, as indicated by **605**. Responsive to a determination that the local bump event has occurred, the method **600** proceeds beyond the operation at **605**; otherwise, the operation at **605** repeats. Responsive to the transmitting external defibrillator **602** determining that the local bump event has occurred, the transmitting external defibrillator **602** may optionally record a time of the local bump event, as indicated by **607**.

[0102] In an optional operation at **608**, the receiving external defibrillator **601** causes a user confirmation request to be output to a user interface (UI) of the receiving external defibrillator **601**. In a subsequent optional operation at **610**, a determination is made as to whether a user confirmation is received from a user responsive to the user confirmation request being output to the user interface. Responsive to a determination that the user confirmation is received, the method **600** may proceed; otherwise, the method **600** returns to the operation at **604**.

[0103] In an optional operation at **611**, the receiving external defibrillator **601** determines whether the transmitting external defibrillator **602** is within a certain distance. For example, a first GPS unit of the receiving external defibrillator **601** may determine first GPS coordinates corresponding to the receiving external defibrillator **601** and compare them to second GPS coordinates corresponding to the transmitting external defibrillator **602**. In certain embodiments, the second GPS coordinates corresponding to the transmitting external defibrillator **602** are determined by a second GPS unit of the transmitting external defibrillator **602**.

[0104] Responsive to a determination that the transmitting external defibrillator **602** is not within the certain distance, e.g., the transmitting external defibrillator **602** is beyond a predetermined distance, based on the comparison between the first and second GPS coordinates, the method **600** may return to the operation at **604** and the receiving external defibrillator **601** may send a message or alert to the transmitting external defibrillator **602** or other device; otherwise, the method **600** may proceed to the operation at **612**.

[0105] In an operation at **612**, the receiving external defibrillator **601** communicates with a transmitting external defibrillator **602**, as indicated by **613**, to establish a communication link ("comlink") **617** with the transmitting external defibrillator **602** responsive to the determination that the local bump event has occurred.

[0106] At **614**, the transmitting external defibrillator **602** may determine whether the communication link **617** has been established. If the communication link **617** has not been established, the method **600** returns to the operation at **605**. In an operation at **616**, the transmitting external defibrillator **602** may cause a data signal to be transmitted from the transmitting external defibrillator **602** over the communication link **617** responsive to a determination that the communication link **617** has been established.

[0107] In an operation at **618**, the receiving external defibrillator **601** receives the data signal from the transmitting external defibrillator **602** over the communication link **617**. In certain embodiments, the data signal encodes resuscitation event data stored in the transmitting external defibrillator **602**, such as event data about when a stored electrical charge in the transmitting external defibrillator **602** was guided to a person.

[0108] In an operation at **620**, the receiving external defibrillator **601** decodes resuscitation event data from the received data signal and stores the decoded resuscitation event data within the receiving external defibrillator **601**. For example, the receiving external defibrillator **601** may store the decoded resuscitation event data in a memory of the receiving external defibrillator **601**.

[0109] FIG. **7** is a flowchart for illustrating methods **700** executable by external defibrillators according to embodiments. The methods **700** illustrated in FIG. **7** generally pertain to the establishing of a communication link ("comlink") between a receiving external defibrillator **701**, such as the receiving external defibrillator **601** of FIG. **6**, and a transmitting external defibrillator **702**, such as the transmitting external defibrillator **602** of FIG. **6**.

[0110] In an optional operation at **704**, the receiving external defibrillator **701** determines whether a predetermined time delay has passed. Responsive to a determination that the predetermined time delay has passed, the method **700** may proceed beyond the operation at **704**; otherwise, the operation at **704** repeats. For example, if a certain amount of time has not passed, the receiving external defibrillator **701** may determine that the receiving external defibrillator **701** is not yet ready to receive data from the transmitting external defibrillator **702**.

[0111] In an operation at **706**, the transmitting external defibrillator **702** causes an availability signal to be transmitted to the receiving external defibrillator **701**, as indicated by **707**. In an optional operation at **708**, the receiving external defibrillator **701** determines whether the availability signal has been received from the transmitting external defibrillator **702**.

[0112] In an operation at **710**, the receiving external defibrillator **701** causing a readiness signal to be transmitted to the transmitting external defibrillator **702**, as indicated by **711**. In an operation at **712**, the transmitting external defibrillator **702** determines whether the readiness signal has been received from the receiving external defibrillator **701**. In a subsequent operation at **714**, the transmitting external defibrillator **702** determines whether the readiness signal is valid. In an operation at **716**, the transmitting external defibrillator **702** causes an availability signal to be transmitted to the receiving external defibrillator **701**, as indicated by **717**, responsive to a determination that the readiness signal has been validated. In an optional operation at **718**, the receiving external defibrillator **701** determines whether the availability signal has been received from the transmitting external defibrillator **702**.

[0113] In an operation at **720**, the receiving external defibrillator **701** causes a communication link ("comlink") to be established with the transmitting external defibrillator **702**, as indicated by **721**. In an operation at **722**, the transmitting external defibrillator **702** determines whether the communication link has been established. Responsive to a determination that the communication link has been established, the method **700** proceeds beyond the operation at **722**; otherwise, the method **700** returns to the operation at **712**.

[0114] In an optional operation at **722**, the receiving external defibrillator **701** causes a confirmation signal to be transmitted to the transmitting external defibrillator **702** responsive to the communication link being established, as indicated by **723**. In a subsequent operation at **724**, the transmitting external defibrillator **724** receives the confirmation signal from the receiving external defibrillator **701**.

[0115] FIG. **9** is a flowchart for illustrating methods **900** executable by external defibrillators according to embodiments. In an operation at **904**, a transmitting external defibrillator **902**, such as the transmitting external defibrillator **802** of FIG. **8**, stores resuscitation event data in a memory of the transmitting external defibrillator **902**. The resuscitation event data may pertain to the delivery of a stored electric charge in the transmitting external defibrillator **902** to a person, for example.

[0116] In an operation at **906**, the transmitting external defibrillator **902** determines whether a local bump event has occurred. Responsive to a determination that the local bump event has occurred, the method **900** proceeds beyond the operation at **906**; otherwise, the operation at **906** repeats. Responsive to the determination that the local bump event has occurred, the transmitting external defibrillator **902** may optionally record a time of the local bump event, as indicated by **908**.

[0117] In certain embodiments, a receiving external defibrillator **901**, such as the receiving external defibrillator **801** of FIG. **8**, also determines whether the local bump event has occurred, as indicated by **907**. Responsive to a determination that the local bump event has occurred, the method **900** proceeds beyond the operation at **907**; otherwise, the operation at **907** repeats. Responsive to the receiving external defibrillator **901** determining that the local bump event has occurred, the receiving external defibrillator **901** may optionally record a time of the local bump event, as indicated by **909**.

[0118] In an operation at **914**, the transmitting external defibrillator **902** causes a communication link **917** to be established with the receiving external defibrillator **901**, as indicated by **915**, responsive to determining that the local bump event has occurred.

[0119] In a subsequent operation at **916**, the transmitting external defibrillator **902** causes a data signal to be transmitted over the communication link **917** to the receiving external defibrillator **901**, the data signal including the resuscitation event data. In an operation at **918**, the receiving external defibrillator **901** receives the data signal from the transmitting external defibrillator **902**.

[0120] In an optional operation at **910**, the receiving external defibrillator **901** causes a user confirmation request to be output to a user interface of the receiving external defibrillator **901**. In an operation at **912**, the transmitting external defibrillator **902** determines whether a user confirmation has been received. Responsive to receiving a user confirmation from a user responsive to the user confirmation request being output to the user interface, the method **900** may proceed; otherwise the method **900** returns to the operation at **906**.

[0121] In another optional operation at **913**, the transmitting external defibrillator **902** determines whether the receiving external defibrillator **901** is within a certain distance. For example, a GPS unit of the transmitting external defibrillator **902** may determine GPS coordinates corresponding to the transmitting external defibrillator **902** and compare them to GPS coordinates corresponding to the receiving external defibrillator **901**. In certain embodiments, the GPS coordinates corresponding to the receiving external defibrillator **901** are determined by a GPS unit of the receiving external defibrillator **901**.

[0122] Responsive to a determination that the receiving external defibrillator **901** is not within the certain distance, e.g., the receiving external defibrillator **901** is beyond a predetermined distance, based on the comparison between the GPS coordinates of the two devices, the method **900** returns to the operation at **906** and the transmitting external defibrillator **902** may send a message or alert to the receiving external defibrillator **901** or other device; otherwise, the method **900** may proceed to the operation at **914**.

[0123] FIG. **10** is a flowchart for illustrating methods **1000** executable by external defibrillators according to embodiments. The methods **1000** illustrated in FIG. **10** generally pertain to the establishing of a communication link ("comlink") between a receiving external defibrillator **1001**, such as the receiving external defibrillator **901** of FIG. **9**, and a transmitting external defibrillator **1002**, such as the transmitting external defibrillator **902** of FIG. **9**.

[0124] In an optional operation at **1004**, the transmitting external defibrillator **1002** determines whether a predetermined time delay has passed. Responsive to a determination that the time delay has passed, the method **1000** proceeds beyond the operation at **1004**; otherwise, the operation at **1004** repeats.

[0125] In an operation at **1006**, the receiving external defibrillator **1001** causes a readiness signal to be transmitted to the transmitting external defibrillator **1002**, as indicated by **1007**. In an operation at **1008**, the transmitting external

defibrillator **1002** determines whether the readiness signal has been received from the receiving external defibrillator **1001**.

[0126] In an operation at **1010**, the transmitting external defibrillator **1002** causes an availability signal to be transmitted to the receiving external defibrillator **1001**, as indicated by **1011**, responsive to a determination that the readiness signal has been received from the receiving external defibrillator **1001**.

[0127] In an operation at **1012**, the receiving external defibrillator **1001** determines whether the availability signal has been received from the transmitting external defibrillator **1002**. In a subsequent operation at **1014**, the receiving external defibrillator **1001** determines whether the availability signal is valid. In an operation at **1016**, the receiving external defibrillator **1001** causes a readiness signal to be transmitted to the transmitting external defibrillator **1002**, as indicated by **1017**, responsive to a determination that the availability signal has been validated.

[0128] In an optional operation at **1018**, the transmitting external defibrillator **1002** determines whether the readiness signal has been received from the receiving external defibrillator **1001**. In a subsequent optional operation at **1020**, the transmitting external defibrillator **1002** determines whether the readiness signal is valid.

[0129] In this description, numerous details have been set forth in order to provide a thorough understanding. In other instances, well-known features have not been described in detail in order to not obscure unnecessarily the description.

[0130] A person skilled in the art will be able to practice the present invention in view of this description, which is to be taken as a whole. The specific embodiments as disclosed and illustrated herein are not to be considered in a limiting sense. Indeed, it should be readily apparent to those skilled in the art that what is described herein may be modified in numerous ways. Such ways can include equivalents to what is described herein. In addition, the invention may be practiced in combination with other systems.

[0131] The following claims define certain combinations and sub-combinations of elements, features, steps, and/or functions, which are regarded as novel and non-obvious. Additional claims for other combinations and sub-combinations may be presented in this or a related document.

What is claimed is:

1. A receiving external defibrillator for receiving resuscitation event data from a transmitting external defibrillator distinct from the receiving external defibrillator, the transmitting external defibrillator including a second housing, a second energy storage module in the second housing that stored a second electrical charge, a second defibrillation port that can be coupled to electrodes, and via which the second electrical charge was guided to a person, and a second wireless communication module, the receiving external defibrillator comprising:

a first housing;

a first energy storage module in an interior of the first housing for storing a first electrical charge;

a first defibrillation port for guiding via electrodes the first electrical charge to the person;

a bump sensor in the interior of the first housing, for generating motion information of the first housing;

a bump detector configured to determine whether the first housing has been subjected to a local bump event based on the generated motion information;

a first wireless communication module;

a processor configured to, responsive to a determination that a local bump event has occurred, cause the first communication module to establish a wireless communication link with the second communication module, the first communication module being further adapted to receive wirelessly a data signal transmitted by the second communication module over the communication link, the data signal encoding event data stored in the transmitting external defibrillator about when the second electrical charge was guided to the person; and

a memory adapted to store the resuscitation event data after being decoded from the data signal.

2. The receiving external defibrillator of claim **1**, in which

a local bump event is determined to have occurred if the motion information is interpreted as a deceleration event with a value larger than a preset threshold.

3. The receiving external defibrillator of claim **1**, further comprising:

a user interface, and in which

a confirmation request is caused to be output via the user interface responsive to the determination that the local bump event has occurred, and

the communication link is caused to be established responsive to receiving by a user a user confirmation in response to the confirmation request.

4. The receiving external defibrillator of claim **1**, in which

establishing the communication link includes causing the first communication module to transmit a readiness signal, and

the data signal is transmitted by the second communication module responsive to receiving the readiness signal.

5. The receiving external defibrillator of claim **4**, in which

the readiness signal communicates identification information about the receiving external defibrillator.

6. The receiving external defibrillator of claim **1**, in which

establishing the communication link includes receiving an availability signal that is generated by the transmitting external defibrillator.

7. The receiving external defibrillator of claim **6**, in which

the availability signal communicates identification information about the transmitting external defibrillator.

8. The receiving external defibrillator of claim **1**, in which

establishing the communication link includes establishing a bump confirmation that the local bump event also involved the transmitting external defibrillator, and

the data signal is received only if the local bump confirmation is established.

9. The receiving external defibrillator of claim **8**, in which

establishing the communication link further includes causing the first communication module to transmit a readiness signal, and

the readiness signal is output with a preset time delay after a time of the local bump event.

10. The receiving external defibrillator of claim **8**, in which

establishing the communication link further includes causing the first communication module to transmit a readiness signal, and

the readiness signal encodes a time indication associated with the occurrence of the local bump event.

11. The receiving external defibrillator of claim **8**, in which

establishing the communication link further includes causing the first communication module to transmit a readiness signal, and

the readiness signal is output with a randomized time delay within a preset time after the local bump event.

12. The receiving external defibrillator of claim **8**, in which

establishing the communication link further includes receiving an availability signal that is generated by the transmitting external defibrillator,

a time of a remote bump event of the transmitting external defibrillator is determined from the availability signal, and

the bump confirmation is established by comparing the time of the remote bump event with a time of the local bump event.

13. The receiving external defibrillator of claim **12**, in which

for the time comparison, the availability signal is presumed output with a preset time delay after a time of the remote bump event.

14. The receiving external defibrillator of claim **12**, in which

for the time comparison, the availability signal encodes the time indication of the remote bump event.

15. The receiving external defibrillator of claim **1**, further comprising:

a global positioning system (GPS) unit configured to determine GPS coordinates corresponding to the receiving external defibrillator, and in which

the processor is further configured to cause the first communication module to not establish a wireless communication link with the second communication module based on the GPS coordinates.

16. A method, comprising:

a receiving external defibrillator determining whether a local bump event has occurred;

responsive to a determination that the local bump event has occurred, the receiving external defibrillator establishing a communication link with a transmitting external defibrillator;

the receiving external defibrillator receiving a data signal from the transmitting external defibrillator over the communication link;

the receiving external defibrillator decoding resuscitation event data from the received data signal; and

the receiving external defibrillator storing the decoded resuscitation event data within the receiving external defibrillator.

17. The method of claim **16**, further comprising:

the receiving external defibrillator causing a user confirmation request to be output to a user interface of the receiving external defibrillator.

18. The method of claim **17**, further comprising:

receiving a user confirmation from a user responsive to the user confirmation request being output to the user interface.

19. The method of claim **16**, in which

establishing the communication link comprises the receiving external defibrillator determining whether a predetermined time delay has passed.

20. The method of claim **16**, in which

establishing the communication link comprises the receiving external defibrillator causing a readiness signal to be transmitted to the transmitting external defibrillator.

21. The method of claim **20**, in which

establishing the communication link further comprises the receiving external defibrillator determining whether an availability signal has been received from the transmitting external defibrillator.

22. The method of claim **16**, in which

establishing the communication link comprises the receiving external defibrillator determining whether the transmitting external defibrillator is located no more than a predetermined distance away from the receiving external defibrillator based on first and second sets of global positional system (GPS) coordinates that correspond to the receiving external defibrillator and the transmitting external defibrillator, respectively.

23. The method of claim **16**, further comprising:

responsive to the communication link being established, the receiving external defibrillator causing a confirmation signal to be transmitted to the transmitting external defibrillator.

24. The method of claim **16**, further comprising:

responsive to the determination that the local bump event has occurred, the receiving external defibrillator recording a time of the local bump event.

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