



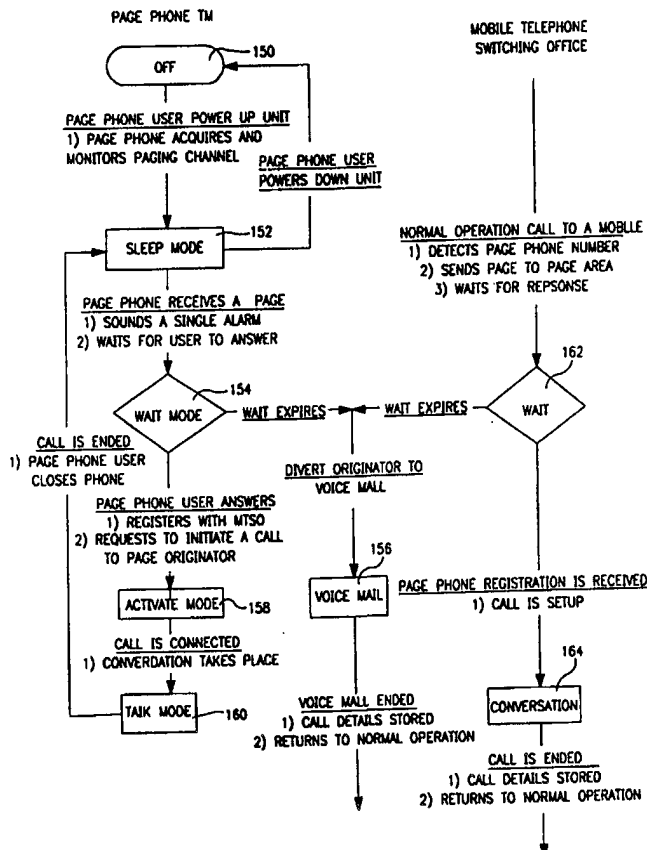
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(54) Title: SYSTEM, METHOD AND APPARATUS FOR "CALLER ONLY" INITIATED TWO-WAY WIRELESS COMMUNICATION WITH CALLER GENERATED BILLING

(57) Abstract

A system and method for a two-way wireless communication is disclosed which can only be initiated by, and billed to, a caller (120). The system utilizes a subscriber (130) apparatus having pager and radiotelephone functions whereby a caller (120) may call the apparatus and gain direct two-way communication with the subscriber (130). The caller (120) is billed for the communication. The present invention also includes a method and apparatus for caller (120) only initiated two-way wireless communication wherein a user can initiate an outgoing connection to at least one predetermined telephone number in order to send a pre-recorded message requesting a call back from the recipient. The user is unable to initiate any real time two-way communication with the outgoing connection.



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**SYSTEM, METHOD AND APPARATUS FOR "CALLER ONLY" INITIATED
TWO-WAY WIRELESS COMMUNICATION WITH CALLER GENERATED BILLING**

Field of the Invention

The present invention relates generally to a personal communication system,
5 method and apparatus which employs two-way wireless communication that can only
be initiated by, and billed to, a caller. The system uses a method for billing the calling
party in a wireless communication system using a one-way signal transfer. More
particularly, the present invention is directed to a system which utilizes a subscriber
apparatus having pager and radiotelephone functions to generate two-way wireless
10 communication by an outside caller calling a subscriber's page number wherein the
caller is billed for the communication time and the subscriber is unable to incur
communication charges due to their inability to initiate or place a call with the
apparatus. Further, although the subscriber is unable to initiate a call using the
apparatus, the system of the present invention may include the ability to split the
15 cost, or a portion of the cost, for any given call between the subscriber and the caller.

The present invention is also directed to a caller only initiated two-way wireless
communication system, method and apparatus having call back request features. The
call back request features comprise a switching means located on the apparatus that
is capable of sending a pre-recorded message from the subscriber apparatus to an
20 emergency telephone number such as "911" and/or a pre-determined telephone
number which are stored within the device. The pre-recorded message which is sent
to these stored numbers requests that the party receiving the pre-recorded call initiate
contact with the subscriber by calling the subscriber's page number. Paging the
subscriber initiates two-way wireless communication which can be carried out when
25 the subscriber answers the page signal.

Background of the Invention

Mobile radio communication is well known in the art. Cellular radio has
spawned Personal Communication Service (PCS). PCS is wireless and the user
requires no tether such as the wire pair that connects a conventional telephone to a

local serving switch. Cellular radio with a hand held terminal, i.e. hand held cellular telephones, gives the user tetherless telephone communication. Further, paging systems provide the mobile and ambulatory user with a means of being alerted that someone wishes to contact or talk to that person. The cordless telephone is yet
5 another example of a tetherless personal communication device.

The public switched telecommunications network (PSTN) is vast and includes hundreds of national networks that are interconnected to form a gigantic international network. Cellular service is an adjunct to the network. Cellular radio systems provide two-way signaling and communication by usually connecting a mobile terminal to
10 another user through the PSTN where the other user is most commonly a subscriber of the PSTN. Nevertheless, the other user may be a mobile terminal. Most of the connectivity involves connecting wired telephone service to mobile users. The mobile telephone switching office (MTSO) is the heart of a cellular system for a specific serving area. The MTSO is connected to the PSTN by a trunk group. Trunks are the
15 telephone lines connecting one telephone switch or exchange with another.

Paging is a one-way radio alerting system that is a simple extension of the PSTN. Unlike cellular radio systems, the direction of transmission is from a fixed paging transmitter to an individual. Some pagers have digital readouts which provide the individual with a number to call back while others give a short message or enable
20 a transmitter to leave a voice mail by hooking into a voice mail system.

Technology in recent years has resulted in a vast number of cordless telephones, cellular telephones and paging apparatus which exhibit a variety of unique and multiple features. For example, the following described inventions are directed to cellular telephones. U.S. Patent No. 4,908,848 issued to Hanawa discloses an
25 apparatus for a mobile communication system having a handset which can be programmed to lock calls, restrict calls, or time calls. U.S. Patent No. 5,203,009 issued to Bogusz et al. describes a cellular telephone having a fixed calling capacity which limits the use of the phone by only enabling it to call emergency telephone numbers. A similar cellular telephone is described in U.S. Patent No. 5,365,570
30 issued to Boubelik which discloses an emergency radio telephone apparatus having a housing, a radio transceiver for receiving and transmitting modulated radio signals,

and an actuator connected to the housing for actuating the transceiver and initiating the process of connecting to a predetermined emergency phone number. U.S. Patent No. 4,845,772 issued to Metroka et al. describes a portable radiotelephone with control switch disabling having a keypad covered by a movable element which
5 produces an on-hook condition when the movable element is in a first position covering the keypad, and an off-hook condition when the movable element is in a second position exposing the keypad.

Numerous paging systems having various functions and capabilities are also well known in the prior art. For example, U.S. Patent No. 4,906,989 issued to
10 Kasugai describes a paging system having a vehicle mounted repeater with a portable paging receiver detachably mounted on the repeater. Also, U.S. Patent No. 4,940,963 issued to Gutman et al. discloses a paging system having a centrally located terminal and a plurality of remote pager units wherein both automatic and manual acknowledge back signaling is provided.

15 The prior art also includes combined radiotelephone and paging systems as evidenced by the following: i) U.S. Patent No. 5,040,204 issued to Sasaki et al. discloses a cordless telephone apparatus with a removably mounted pager which reports an incoming signal from a parent device or radiotelephone; ii) U.S. Patent No. 4,747,122 issued to Bhagat et al. describes a mobile paging call back system which
20 includes a control unit interconnecting a radio pager, a memory, an indicator, a control switch, and an automatic dialer with the control unit including a logic circuit that is programmed to verify valid telephone number information received from a pager, to store the verified data in memory, to activate the indicator to show that valid data has been received and to transfer the stored data to the automatic dialer
25 to reach a mobile radiotelephone; iii) U.S. Patent No. 5,117,449 issued to Metroka et al. discloses an integrated paging and radiotelephone apparatus which combines paging and cellular radiotelephone functions in a single unit having dual receivers thereby allowing reception of paging signals simultaneously with cellular radiotelephone signals; and iv) U.S. Patent No. 5,148,473 issued to Freeland et al.
30 which describes an apparatus combining a radio pager and a cellular radiotelephone into one unit which may automatically receive a plurality of pages while the cellular

radiotelephone is on and communicating a cellular telephone call, or off or unattended.

Although combined radiotelephone and paging systems have been described, none of those systems prevents initiation of a radiotelephone call by the subscriber
5 or holder of the dual paging/radiotelephone system, nor do any of those combined systems described above include a system wherein only the outside calling party pays for the telecommunication when the caller and subscriber are activated. Either one or both of these features would drastically reduce fraudulent use of the wireless two-way communication system. Further, implementation of either or both of these
10 features would enable a subscriber to exert optimum control over costs.

Accordingly, there is a need for a wireless two-way communication system, method and apparatus which allows for incoming calls but prevents outgoing calls in order to control costs and fraudulent use of the system. This is particularly useful in those situations where companies would like to enable their employees to have
15 wireless two-way communication with one another in order to facilitate job efficiency. For example, individual employees such as sales persons, drivers and delivery personnel, real estate agents, and hospital personnel could be equipped with the present invention in order to communicate with others within or outside of their organization either out in the field or within a large facility that houses the employees.
20 There is also a need for such a system where the calling party is billed for the call so that a pager number is not given out to numerous individuals by the person carrying the apparatus thereby enabling anyone to run up telephone toll charges associated with use of the apparatus during two-way communication.

Parents would be another target market for this system and apparatus in that
25 it would enable children to be directly connected to their parents upon being paged by their parents without the expense of cellular telephone charges. Such a system would also prevent the accumulation of billings associated with frivolous or unnecessary calls made by children within the system in that the system does not allow for those possessing the apparatus to make outgoing calls. Further, if the
30 apparatus were stolen, it would be impossible to commit further fraud by charging the communication system for calls because the system employs caller generated billing.

Finally, there is a need for a caller only initiated wireless two-way communication system and apparatus which provides a subscriber of the system and apparatus with some ability to contact a predetermined party without enabling the subscriber to initiate two-way wireless communication with that party thereby
5 keeping the fraud and cost control functions of the system and apparatus intact. This can be achieved by enabling the system and apparatus to send a pre-recorded message from the subscriber to a pre-determined telephone number such as an emergency number, e.g. "911", a home telephone number, or an office or business number. Upon connection with the pre-determined number, the transmitted pre-
10 recorded message informs the receiver of the call as to the subscriber's name and the subscriber's page number. The pre-recorded message may also include a brief message from the subscriber and then instructs the receiver to page the subscriber in order to initiate two-way wireless communication with the subscriber.

Summary of the Invention

15 It is a principal object of the present invention to provide a two-way wireless communication system, method and apparatus wherein the calling party pays and the two-way wireless communication can only be initiated by the caller.

It is another object of the present invention to provide a two-way wireless communication system that establishes instant two-way wireless communication
20 between a public switched telecommunications network caller and a subscriber having an apparatus with means to receive both paging signals and radiotelephone signals through a caller generated billing system.

It is further object of the present invention to provide a two-way wireless communication system and method that establishes instant two-way wireless
25 communication between a wireless radiotelephone caller and a subscriber having an apparatus with means to receive both paging signals and radiotelephone signals through a caller generated billing system.

It is still another object of the present invention to provide a method and apparatus for selectively receiving incoming calls only from a telephone system

wherein the calling party pays in accordance with their associated telephone toll system.

It is yet another object of the present invention to provide a wireless communication system, method and apparatus which utilizes a caller generated billing
5 system and has an automatic voice mail call back means.

It is still another object of the present invention to provide a method for reducing fraud associated with the personal communications system.

Yet another object of the present invention is to provide a caller only initiated two-way wireless communication system and apparatus which enables a subscriber
10 to request a call back to the subscriber from a pre-determined call back number or emergency number without allowing the subscriber to initiate unrestricted, real time two-way wireless communication using the apparatus.

In brief, the caller only generated two-way wireless communication system includes:

- 15 1) means for initiating a call to an apparatus having a mobile identification number;
- 2) means for receiving and processing the mobile identification number such that a wireless connection is made between at least one of a radiotelephone or a telephone associated with the initiating call
20 and the apparatus thereby establishing a two-way communication between the means for initiating a call and the apparatus; and
- 3) means for charging the call to at least a portion of an account associated with the means for initiating a call.

The objects and features of the present invention, which are believed to be
25 novel, are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages, may best be understood by reference to the following description, taken in connection with the accompanying drawings wherein like numerals denote like elements.

Brief Description of the Drawings

FIG. 1A shows a block diagram of a first preferred embodiment of the electronic circuitry of an apparatus for use with the personal communication system and method of the present invention which employs two-way wireless communication that can only be initiated by, and billed to, the caller.

FIG. 1B shows a block diagram of a second preferred embodiment of the electronic circuitry of an apparatus for use with the personal communication system and method of the present invention which employs two-way wireless communication that can only be initiated by, and billed to, the caller.

FIG. 2 is a schematic illustrating the conceptual layout of a wireless system and its relation to the public switched telecommunications network.

FIG. 3 is a schematic showing the conceptual layout of the public switched telecommunications network.

FIG. 4 is a flow chart depicting a two-way wireless communication system that establishes instant two-way wireless communication between a public switched telecommunications network caller and a pagephone subscriber in accordance with the present invention.

FIG. 5 is a flow chart depicting a two-way wireless communication system that establishes instant two-way wireless communication between a wireless radiotelephone caller and a pagephone subscriber in accordance with the present invention.

FIG. 6 is flow chart showing a first preferred method for a caller only initiated two-way wireless communication with caller generated billing in accordance with the present invention.

FIG. 7 is a flowchart showing a second, more detailed method for a caller only initiated two-way wireless communication with caller generated billing in accordance with the present invention.

FIG. 8A is an open perspective view of a preferred embodiment of the caller only initiated two-way communication apparatus of the present invention having call back request features.

FIG. 8B is a closed perspective view of the preferred embodiment of the caller only initiated two-way communication apparatus of the present invention having call back request features shown in FIG. 8A.

FIG. 9 is an exploded view of the preferred embodiment of the caller only initiated two-way communication apparatus of the present invention having call back request features shown in FIGS. 8A and 8B.

FIG. 10 is a block diagram of one example of the electronic circuitry for carrying out the call back request features of the caller only initiated two-way communication apparatus of the present invention.

FIG. 11 is a flow diagram showing the method steps for carrying out the call back request features of the caller only initiated two-way communication system.

FIG. 12 is a flow chart showing a method for a call back request system used in association with the caller only initiated two-way communication system and apparatus of the present invention.

15 **Detailed Description of the Preferred Embodiments**

The following description is provided to enable any person skilled in the art to make and use the invention and sets forth the best modes contemplated by the inventors of carrying out their invention. Various modifications, however, will remain readily apparent to those skilled in the art, since the generic principles of the present invention have been defined herein specifically to provide for an improved and simplified system for interfacing with a telephone or similar communications system, in any selected location, for enabling a caller to contact a user of an apparatus combining paging functions and radiotelephone functions (hereinafter referred to as a "pagephone") by radiotelephone.

25 By way of example, and not by way of limitation, set forth below is a description of a preferred embodiment of the simplified system, method and apparatus for carrying out the system of the present invention which is directed to a two-way wireless communication system with one way initiation by a caller and caller generated billing.

Turning now to the drawings, a block diagram 10 of one example of an electronic circuitry of an apparatus for use with the personal communication system of the present invention which employs two-way wireless communication that can only be initiated by, and billed to, the caller is shown in FIG. 1. The antenna 12 is used to receive and transmit radiotelephone signals to and from separate receiving circuit 14 and a transmitter circuit 16. The receiving and transmitting circuits 12 and 14 may be assembled using components and methods well known in the art. Both the receiving and transmitting circuits 12 and 14 are coupled to a microprocessor 18. When a signal is received from an outside caller having the correct mobile identification (M.I.D.) number of the pagephone, the microprocessor 18 will activate an alert signal such as an audio signal 20 or vibrator 22. If the pagephone is then fully opened (i.e. a flip element is moved into the open position such as with a flip phone), and not in use, a further switch means is activated in the pagephone. Activation of the further switch means enables the microprocessor to activate the radiotelephone transmitter 16 so that the pagephone will receive incoming signals and transmit outgoing signals to thereby allow a conversation to take place between the caller and the user of the unit. It is also contemplated that a caller identification system may be incorporated into the method and apparatus of the present invention to allow a user of the apparatus to determine who is paging that user before the user answers the page and connects with the caller.

The apparatus for use with the electronic circuitry preferably comprises a transmitting means that is only capable of transmitting radiotelephone signals that are associated with the signals received from the pagephone. The system may also include an optional voice mail means 26 which is later described with reference to FIGS 6 and 7. The system may further include an interface circuit 28 which is coupled to the microprocessor 18 which sends verbal voice mail message left by callers to a pager receiver 30. The pager receiver 30 transmits the voice mail messages to a speaker 32 which enables the pagephone user to hear their voice mail messages without accessing a telephone to retrieve their messages. The speaker 32 may also be coupled to a liquid crystal display (LCD) 34 which can show the number of the message, the time the message was left, and the telephone number of the

caller. If the pagephone is in use during the transmission of another call to the pagephone, the voice mail message system may be triggered automatically to replay stored messages upon closing the flip element of the page phone. Upon closing the flip element, the pagephone either visibly or audibly indicates that voice mail
5 messages have been stored. The user then opens the flip element to retrieve and listen to the voice mail messages.

Other radiotelephone transceiving apparatus that may be successfully used in conjunction with the caller initiated and billed personal communication system of the present invention are disclosed and described in detail in U.S. Patent No. 5,574,772
10 which is directed to a personal apparatus for receiving radiotelephone communications and is herein incorporated by reference.

A second preferred embodiment of the hardware comprising the electronic circuitry of an apparatus for use with the personal communication system of the present invention which employs two-way wireless communication that can only be
15 initiated by, and billed to, the caller is shown in FIG. 1B. The major components shown are comparable to those found in most makes of wireless mobile phones.

The antenna 40 is used to receive and transmit radiotelephone signals to and from the radio frequency transmitter/receiver 42. The radio frequency transmitter/receiver 42 converts the radio frequency analog into digital when a signal
20 is received and converts the digital to analogue when a signal is transmitted from the radio frequency transmitter/receiver 42. The digital signal modulator/demodulator 44 is responsible for the generation of the radio frequency signal which is transmitted to the MTSO when the pagephone has been activated upon receipt of a signal. Current state of the art microchips for phones include this functioning for either time division
25 multiple access (TDMA) digital techniques or code division multiple access (CDMA) digital techniques. The system, method and apparatus of the present invention can be used with these and any other wireless protocols currently available or which may later become available.

The digital signal modulator/demodulator 44 is connected to the central
30 processor unit (CPU) 46 through the data bus and address bus. The CPU 46 is responsible for handling the protocols needed for processing a call and other call

related functions such as the voice mail system. Upon receipt of a signal indicating the receiving of an outside call from the MTSO, the CPU 46 will activate an alert or alarm 48 in the form of an audio signal or vibration. A speaker/microphone 49 is coupled to the Codec 50 which is used to convert the voice data from analog to digital and digital to analog. Once the voice data is converted, the DSP (Vocoder) 52 is used to compress the output of Codec 50 in order to reduce the bandwidth of the voice data. Data may be stored in the data memory 54 and additional programmable functions may be stored in the program memory 56 until accessed.

FIG. 2 shows a schematic illustration of the wireless system layout and its relation to the public switched telecommunications network while FIG. 3 shows a schematic of the public switched telecommunications network. In FIG. 3, there are numerous individual subscribers 60 that subscribe to the PSTN and these subscribers are linked to local exchange carriers (LEC) 62,64 and are interconnected by trunks. Toll connecting trunks 66 connect the local network 62,64 to the toll network 68.

FIG. 2 shows the mobile telephone switching office (MTSO) as the heart of the wireless system for a specific serving area. The conventional wireless telecommunications switched network 70 is a network consisting of a plurality of wireless antennae 72 capable of receiving wireless band radio frequency signals 74, with each of the plurality of wireless antennae 72 being associated with a discrete cell site 76. The plurality of antennae 72 represent mobile units. The mobile units may be hand held or vehicle mounted terminals. Each of the plurality of wireless antennae 72 is electrically linked to a wireless switch 78 (the MTSO) which governs the operation of the wireless telecommunications switched network 70 and links the network 70 to a local exchange carrier 80 via T1 land lines 82. As previously described with reference to FIG. 2, the local exchange carrier 80 is connected to the toll network 84 via connecting trunks 86. Satellite means 88 may also be used to access the MTSO 78 via satellite signals 90. The MTSO 78 can then access the toll system 84 as previously described.

A flow chart depicting a two-way wireless communication system establishing two-way wireless communication between a public switched telecommunications network caller and a pagephone subscriber, including caller generated billing, in

accordance with the present invention is shown in FIG. 4. A PSTN land caller 100 initiates a telephone call by dialing a pagephone number. The pagephone number is transmitted to the Local Exchange Carrier (LEC) 102. The LEC 102 sends a signal to the Signal Transfer Point (STP) 104 requesting connection and the STP 104 signals
5 the Mobile Telephone Switching Office (MTSO) 106 wireless service provider. The MTSO 106 pages the pagephone via a cell site 108 of the MTSO 106 and the pagephone subscriber activates the pagephone 110 upon being alerted to the page by an audio tone or vibration emanating from the pagephone 100. Activating the pagephone 110 may constitute a simple action such as flipping open a cover element
10 on the pagephone 110 or depressing an activation button. The call is then set up as a mobile to land call and billing is stored as a pagephone call. Once the pagephone 110 is activated, the MTSO 106 sends a signal and the call is connected to the LEC 102 so that the land caller 100 is answered by the pagephone user or subscriber.

Referring now to the caller generated billing aspect of the invention, it was
15 previously mentioned that the MTSO 106 stores the details of the call, i.e. the call details 112, to the pagephone 118 as a pagephone call. The LEC 102 then retrieves the call details from the MTSO 106 and the LEC 102 bills the land caller 100. Alternatively, the system of the present invention may be set up to generate split billing such that the subscriber pays a set portion, or a predetermined percentage,
20 of the call and the land caller pays for the remaining portion of the call.

A wireless telephone may also be used to initiate a call to the pagephone which is used with the two-way wireless communication system of the present invention. FIG. 5 is a schematic depicting a two-way wireless communication system that establishes calling party pays two-way wireless communication between a wireless
25 radiotelephone caller and a pagephone subscriber in accordance with the present invention. The wireless (mobile) caller 120 initiates a telephone call by dialing a pagephone number. The call is received by a cell site 121 of the MTSO (B) 122, which is the mobile telephone switching office wireless service provider for the wireless (mobile) caller. The MTSO (B) transmits the signal to the local exchange
30 carrier (LEC) 124 and the LEC 124 requests connection by sending a signal to the signal transfer point (STP) 126.

The STP 126 then signals the MTSO (A) 128 which is the mobile telephone switching office wireless service provider for the pagephone subscriber. The MTSO (A) 128 pages the pagephone 130 via a cell site 132 of the MTSO (A) 128 and the pagephone subscriber activates the pagephone 130 upon being alerted to the page
5 by an audio tone or vibration emanating from the pagephone 130. Activating the pagephone 130 may constitute a simple action such as flipping open a cover element on the pagephone 130 or depressing an activation button. The call is then set up as a mobile to land call and billing is stored as a pagephone call. Once the pagephone 130 is activated, the MTSO (A) 128 sends a signal and the call is connected to the
10 LEC 124. The LEC 124 sends a signal to the MTSO (B) 122 and upon the MTSO (B) receiving the signal, the call is connected to the MTSO (B) so that the wireless (mobile) caller 120 is answered by the pagephone user or subscriber.

Billing of the wireless caller 120 may occur in one of two ways. First, the MTSO (B) 122 of the wireless service provider for the wireless caller 120 may store
15 the call details 134 of the call made to the pagephone as a pagephone call and the LEC 124 may retrieve the call data 134 from the MTSO (B) 122 and bill the wireless caller 120 through their wireless service provider. Second, the MTSO (A) 128 of the wireless service provider for the pagephone subscriber may store the call details 136 of the pagephone call. The LEC 124 can then retrieve the call data from the MTSO
20 (B) and bill the wireless caller 120 through their wireless service provider. Alternatively, the system of the present invention may be set up to generate split billing between the subscriber and the caller such that the subscriber pays a set portion, or predetermined percentage, of the call and the wireless caller pays for the remaining portion of the call.

25 A flow chart showing a first preferred method for a caller only initiated two-way wireless communication with caller generated billing in accordance with the present invention is shown in FIG. 6. More specifically, this flow chart outlines the functioning for the pagephone apparatus in its prescribed system and network area. The initial function of the pagephone is virtually the same as a normal pager. In the
30 Off state 150, no power is applied and the pagephone is unable to receive any kind of information. In order to utilize the pagephone, the pagephone subscriber powers

up the unit to the Sleep Mode 152. In this mode, the pagephone acquires the paging channel timing and monitors the paging channel for incoming pages. Once the pagephone receives a page, from either a land or mobile caller, the subscriber is alerted to the page by either an audible sound or a vibration. The pagephone unit
5 then enters the Wait Mode 154. The pagephone will then wait for a specified amount of time to allow the pagephone user or subscriber to answer the pagephone. This period will typically be a matter of seconds.

If the time period expires without an answer, the outside caller is diverted to the pagephone's voice mail system 156, which is later described in further detail with
10 reference to FIG. 7. When the voice mail ends, the call details are stored and the pagephone returns to the Sleep Mode 152. Alternatively, if the pagephone is answered in the specified period of time, the pagephone enters the Active Mode 158. When the pagephone user answers the pagephone, it sends a registration message to the Mobile Telephone Switching Office (MTSO) in order to make its exact
15 whereabouts known, and to request a call set up to the page originator. The page originator is preferably identified in the page message so that the pagephone user can determine whether or not they want to take the call. Once the MTSO connects the call, the pagephone enters the Talk Mode 160 during which a two way conversation takes place between the pagephone user and the call originator. Upon completion of
20 the call, the pagephone returns to the Sleep Mode 152.

Turning now to the MTSO functions, the MTSO detects a pagephone number, sends the page to the pagephone, and then enters the Wait Period 162 to wait for a response. If a timely response is received, the MTSO sets up the call and the Conversation Mode 164 is entered. The MTSO then records and stores the call
25 details. The caller initiating the call to the pagephone is then charged for the air time of the call.

Local pagephone calls will preferably be given priority on the paging channel in its area of coverage over normal pagers in order to ensure that pagephone calls are initiated with a page message within seconds of originating a call to the pagephone.
30 The pagephone's Wait Mode 154 will typically range from three to five seconds. The Wait Period at the MTSO will be a similar range but will always be greater than that

of the pagephone. Registration and call set up is expected to take approximately three to fifteen seconds depending upon the distance of the call and the time of day. In the event that the cellular system is loaded and the page cannot be issued instantly, the originator of the call to the pagephone will be diverted to voice mail.

5 As an alternative to having the originating caller wait on line for the call to be connected, a "Call Back" feature may be implemented. This feature would provide the originator of the call with a message to hang up their phone and wait to be contacted. Once the pagephone receives the page and the call is connected, the originator's telephone would then call the pagephone back. This feature can be used
10 during hours of peak load on the cellular system instead of diverting to voice mail. This feature could also be provided to the pagephone subscriber as an option provided by the service provider.

The main advantage of the pagephone system, method and apparatus of the present invention is that it is entirely passive and does not transmit any signals while
15 in the Sleep Mode. Transmission is only initiated after a page message addressed to the pagephone is received and the pagephone user answers the pagephone. This transmission is to register the pagephone's existence with the MTSO and to set up the call. Therefore, the pagephone's location within the local area is unknown up to the point where it is contacted by an originating caller. This system and method will
20 reduce the load on all other channels and prolong the life of the pagephone's battery.

FIG. 7 depicts a flowchart showing a second, more detailed method for a caller only initiated two-way wireless communication with caller generated billing in accordance with the present invention. Referring now to FIG. 7, an outside caller
25 pagephone number. The call from the outside caller 220 is transmitted to a hardline switch or LEC 222 which is then transmitted to a telephone toll system 224. The call is then transmitted to the MTSO (wireless switch) 226 and the MTSO 226 sends a signal to a unit in step one 228.

The unit is preferably a radiotelephone transceiving apparatus in the form of a
30 pagephone which comprises: 1) a housing with no keypad and no keypad circuitry so that the apparatus is a caller initiated only receiving apparatus for wireless two-way

communication where no outgoing calls can be initiated by a user, 2) a receiving means for receiving radiotelephone signals contained within the housing, 3) transmission means for transmitting radiotelephone signals by the receiving means upon receipt of radiotelephone signals by the receiving means whereby the apparatus
5 can only be used to supervise a two-way voice communication initiated from another telephone apparatus, 4) processing means coupled to the transmission means and receiving means for processing received signals and only transmitting radiotelephone signals in response to receipt of a signal having the correct mobile identification number of the transceiving apparatus whereby the processing means cannot create
10 an outgoing address signal and can only produce an alert signal in response to a signal having the correct mobile identification number, and 5) means for indicating that radiotelephone signals coupled to the processing means are received.

In step two 230, the toll system 224 determines if the call was received by the unit. If the call was not received, the system 224 determines if the unit is in use
15 232. If the unit is in use, the system 224 has to determine if the caller has disconnected 234. The caller may be able to leave a voice mail message for the user. Two options exist for the voice mail - the voice mail can either be manually retrieved by the user of the unit 236 or the voice mail can automatically call back and play a message via the wireless system 238. With respect to the manual voice mail retrieval
20 option, a pagephone subscriber may either access a telephone and call their page number to receive messages or, alternatively, the subscriber may manually push a "play" button on the pagephone which will play back voice mail messages that are recorded directly into the pagephone via a miniature recording system.

If the unit is not in use, the system 224 determines if the unit is out of the
25 service area 240. If the system 224 is out of the service area, the system 224 returns to determine whether the caller has disconnected 234. If the unit is in the service area 240 the system 224 determines if the signal received by the unit is too low for transmission 242. If the signal received by the unit is too low for transmission 242, the system 224 returns to determine whether the caller has
30 disconnected 234. If the signal received by the unit is not too low for transmission, the system 224 determines if the unit responds to the incoming signal within a

predetermined time 244. If the unit does not respond to the incoming signal within the predetermined time 244, then the system 224 returns to determine whether the caller has disconnected 234.

If the unit responds to the incoming signal then the unit is activated for two-
5 way communication between the caller and the unit subscriber 246. If the call was received by the unit and not activated 248 then the caller 220 can leave a voice mail message for the unit 236,238. If the unit is activated 248 and normal two-way communication proceeds 246, the toll system begins to count air time 250. When the call is completed the unit is deactivated 252 and the air time count is stopped
10 254. The total air time is calculated and recorded and billed to the outside caller's initiating telephone number 256. The unit then returns to the sleep mode 258.

The foregoing has described a simplified two way wireless communication system wherein the calling party initiates the call and pays for the call. The system does not allow for transmitting outgoing calls and only allows for receiving incoming
15 calls thereby reducing fraud and creating a method for use by employers and parents alike that allows for controlling costs of two-way wireless communication.

Turning now to FIG. 8A, there is shown a first preferred embodiment of the caller only initiated two-way communication apparatus 270 of the present invention having call back request features. The apparatus 270 comprises a body 272 and a
20 rotatably coupled flip element 274. The body 272 and flip element 274 are preferably comprised of a hard plastic or other suitable material. The body 272 may be any desired size but in a preferred version is approximately four inches in height, two inches in width, and one inch in thickness. The flip element 274 is preferably three and one-half inches in length and one and one-half inches in width. The body
25 272 includes an internal face portion 279, having no keypad or other call producing elements thereon, which lies in continuous adjacent communication with an internal surface 275 of the flip element 274. The flip element 274 has a microphone 276 affixed therein.

The flip element 274 includes an antenna 278, which may be contained
30 internally in a known manner or may extend outwardly from a top side 280 of the apparatus 270, and a speaker 282 disposed in the body 272. The speaker 282 is

located near the top side 283, and affixed to an interior portion of, the internal face 279 of the body 272. A switching means for switching the apparatus from a sleep state to an awake state comprising a push button 286 or any other known means is positioned so that the flip element 274 opens and closes the switching means upon
5 opening and closing the flip element 274. That is, when the flip element 274 engages internal face portion 279, the apparatus 270 will be in the activated state, ready to receive a call and conduct two-way communication, as described more fully below. Alternatively, a switching means for receiving an incoming call may be positioned anywhere else on the pager where its activation is dependent upon
10 manually depressing the push button or manually sliding a switch.

A detachable, rechargeable battery pack 288 may be slidably coupled within the internal face portion 279 of the body 272 for providing power to the electronic circuitry of the apparatus 270. This internal positioning of the battery pack 288 results in a more streamlined apparatus which protects the battery pack from being
15 inadvertently knocked off or disconnected from the body 272. An optional light emitting diode (L.E.D.) may be located on the back side (not shown) of the body 272 or on the internal face portion 279. The L.E.D. is used to indicate when the output of the battery 288 drops below a desired level.

A connection jack 289 may also be contained within the body 272 of the
20 apparatus 270 to allow for the connection of a keyboard or other information inputting device. The keyboard or information inputting device (not shown) enables the input of a pre-determined call back number and message from a user whereby the user can later select an activation switch or button associated with the pre-determined call back number and the pre-determined call back number will be
25 transmitted. The recipient of the pre-determined call back number will then hear a message requesting the recipient to call the user at the user's pager number. This addition to the apparatus 270 still substantially limits the user's ability to use the apparatus 270 for two-way wireless communication. The user cannot initiate unlimited two-way communication but instead can only send a message requesting
30 a call back.

Control of inputting the pre-determined information via an inputting device (not shown) may be at the point of sale of the apparatus 270. Alternatively, the purchaser of the apparatus 270 may control the information input into the device by keeping the inputting device separate from the apparatus 270 and exerting control
5 over the inputting device.

The flip element 274 contains switches, push buttons, or touch pads for the ON/OFF function 300, a tone/vibrator function 301, an emergency call back numbers function 302, a predetermined call back number function 298, a record function 294, and a call waiting/voice mail play back function 303. The record switch pad 294
10 allows a subscriber to pre-record a message for later transmission to a predetermined telephone number in order to relay a request for the receiver to call back the subscriber to the apparatus 270 of the present invention. The apparatus 270 also includes call back request features in the form of a predetermined call back number switch pad 298 and an emergency call back number switch pad 302. The
15 predetermined call back number may comprise either a home or office telephone number. An ON/OFF switch pad for the apparatus 270 is also included.

Alternatively, the call back number switch pad 298, the emergency call back number switch 302 and the ON/OFF switch pad for the apparatus 270 may all constitute one switch pad which activates the different features according to the
20 number of depressions of the switch pad. Also, in order to avoid accidental activation, the emergency call back number switch pad 302 may be set apart from, and away from, the predetermined call back number switch pad 298 and the ON/OFF switch pad 300.

Actuation of switch pads 298 or 300 causes operation of the apparatus 270
25 to transmit a predetermined call back number or an emergency call back number, respectively, to a mobile telephone switching office (MTSO) to effectuate telephonic communication with a fixed site of a telephonic network associated with the respective call sequence.

FIG. 8B shows a closed perspective view of the pagephone apparatus shown
30 in FIG. 8A. In the closed position, a liquid crystal display 304 is located within the top side 280 of the flip element 274. This allows the pagephone user or subscriber

to view the text or numerical numbers which may have been left by a caller. The flip element 274 is folded shut against the body 272 of the pagephone such that the battery pack 288 is contained and protected within the closed pagephone apparatus 270. The rotatable element 305 which secures the flip element 274 to the body 272
5 can be clearly seen.

Turning now to FIG. 9, there is an exploded view of the preferred embodiment of the pagephone apparatus 270 shown in FIGS. 8A and 8B. A clip 370, clip spring 372, and clip pin 374 are attached to the outer surface 376 of the body 274 of the pagephone apparatus 270. A speaker 378 and a lithium battery 380 are placed
10 within the internal surface 279 of the body 272 of the apparatus 270. A battery cover 382 is used to cover and hold the lithium battery 380 in place. A power-on light 384 and an LCD cover 386 are placed on an outer surface of the flip element 274 so that they can be easily viewed by a user while a PC board 388, an antenna 390, and a microphone 392 are positioned within the flip element. A power button
15 394 is secured within the inner surface 275 of the flip element 274 to enable the unit to become activated upon opening of the flip element 274. Finally, a removable clip element 396 may be used in place of a clip element 370 that is secured to the outer surface 376 of the body 272 of the pagephone apparatus 270. The removable clip element 396 is designed to slide over a substantial portion of the body 272 such that
20 the body 272 is seated within the removable clip element 396.

Turning now to the functions contained within, and capable of being carried out by, the pagephone apparatus 270, a block diagram of one example of the electronic circuitry for carrying out the call back request features of the apparatus 270 is shown in FIG. 10. A predetermined call back number, i.e. a home, office or business
25 telephone number is entered and stored in a memory section 310 associated with microprocessor 18, which is the same microprocessor referred to in FIG. 1. This predetermined call back number will be the telephone number that is called when the predetermined call back number switch 312 is closed or activated. An emergency call back number such as "911" is also entered and stored in the memory section 310
30 of the microprocessor 18. The emergency call back number will be called when the emergency call back number switch 314 is closed or activated. When either the

predetermined call back number switch 312 or the emergency call back number switch 314 are activated, the memory section 310 of the microprocessor 18 is accessed to obtain the stored telephone number associated with the respective switch. The retrieved telephone number is then sent to the transmitter 16, which is
5 the same transmitter referred to in FIG. 1, so that the signal can be transmitted to the MTSO and the connection can be made between the apparatus 270 and the communication device associated with the transmitted telephone number.

A record switch 316 is connected to a recorder 317 for recording a message from the subscriber which is transmitted to the microprocessor 18 and stored in the
10 memory section 310. The pre-recorded message contains the subscriber's name and pager number along with a request to call the subscriber's pager number in order to initiate two-way wireless communication with the subscriber. The pre-recorded message may also include an additional brief statement from the subscriber.

Upon transmission of and connection with a predetermined or emergency call
15 back number, the memory 210 of the microprocessor 18 is accessed to retrieve the subscriber's pre-recorded message and the pre-recorded message is sent to the transmitter 16 for transmission to the predetermined or emergency call back number. The subscriber can then activate the two-way wireless communication with the predetermined or emergency number upon receiving a signal from an outside caller
20 calling from one of those numbers by flipping the flip element 274 of the apparatus 270 to an open position.

FIG. 11 depicts a flow diagram showing the method steps for carrying out the call back request features of the caller only initiated two-way communication system. First, as indicated in blocks 320 and 322, a predetermined call back number and an
25 emergency number are entered and stored, respectively, in separate sections of the memory 310 of the microprocessor 18. Next, in blocks 324 and 326 initiation of the transmission of the predetermined call back number or emergency number by way of the predetermined call back switch 312 or emergency call back switch 314, respectively, results in accessing the memory section 310 of the microprocessor 18
30 to retrieve the stored telephone numbers associated with the switches 312 and 314 as shown in blocks 328 and 330. Then, as indicated by block 332, the memory

section 310 of the microprocessor 18 is accessed to retrieve the pre-recorded message from the subscriber and the pre-recorded message from the subscriber is transmitted to the retrieved telephone number in block 334. The pre-recorded message may be retrieved from the memory section 16 of the microprocessor 18
5 either before or after the predetermined or emergency telephone number is transmitted and connection is made in order to transmit the pre-recorded message.

A flow chart showing the method for a call back request system used in association with the caller only initiated two-way communication system and apparatus is illustrated in FIG. 12. In step one, it is determined whether either the
10 emergency call back number switch 336 is activated or the predetermined call back number switch 338 is activated. If the emergency call back number switch 336 is activated 340 then the pre-stored emergency telephone number is accessed 342 in step two or, if the predetermined call back number switch 338 is activated 344 then the predetermined call back number is obtained from the microprocessor memory 346
15 in step two.

As can be seen from the flow diagram depicted in FIG. 12, anyone of the emergency call back number switch 336, the predetermined call back number switch 338, or the sleep state 348 can be activated but only one of these functions may be carried out at a time. In other words, if the emergency call back number switch 336
20 is not activated 350, then either the predetermined call back number switch 338 may be activated 344 or the sleep state 348 may be activated to await an outside caller's page. If the predetermined call back number switch 338 is not activated 352, then either the emergency call back number switch 336 can be activated 340 or the sleep state 348 can be activated to await an outside caller's page. Finally, a subscriber
25 may deactivate the sleep state 348 by activating either the emergency call back number switch 336 or the predetermined call back number switch 338.

In step three 354, a signal is sent to the MTSO with the signal being dependent upon which telephone number was retrieved in step two above. A connection is made between the apparatus 270 and either the communication apparatus (e.g.
30 telephone) associated with the emergency call back number or the communication apparatus (e.g. telephone) associated with the predetermined call back number. A

determination is made in step four 356 as to whether the connection has been made between one of the two pre-stored telephone numbers and the apparatus 270. If the connection is made 357, the memory section of the microprocessor is accessed in step five 358 to obtain and retrieve the subscriber's pre-recorded message. The
5 subscriber's pre-recorded message is then transmitted to either the emergency call back number or predetermined call back number in step six 360. Once the pre-recorded message is transmitted, the call is terminated and disconnected in step seven 362. The system then returns to sleep state 348 to await an outside caller's return call in response to the subscriber's pre-recorded message.

10 If the connection between the apparatus 270 and the predetermined call back number or the emergency call back number is not made 364, either the emergency call back number switch 336 or predetermined call back number switch 338 can be activated or re-activated, or, the system may return to sleep state 348.

Those skilled in the art will appreciate that various adaptations and
15 modifications of the just-described preferred embodiments can be configured without departing from the scope and spirit of the invention. Therefore, it is to be understood that within the scope of the appended claims, the invention may be practiced other than as specifically described herein.

We Claim:

1. A caller generated wireless communication and billing system for allowing a recipient to receive a telephone call from an incoming page without the ability to produce any type of outgoing address signal comprising:

- 5 means for initiating a call to an apparatus having a mobile identification number;
- means for receiving and processing said mobile identification number such that a wireless connection is made between at least one of a radiotelephone and telephone associated with said initiating call
- 10 and said apparatus thereby establishing a two-way communication between said means for initiating a call and said apparatus; and
- means for charging at least a portion of said call to an account associated with said means for initiating a call.

15 2. The caller generated system of Claim 1 further comprising a means for indicating that a call is being received by the apparatus.

3. The caller generated system of Claim 1 further comprising a means for enabling a user initiating said call to leave a voice mail message that can be stored in the apparatus via a voice mail messaging system.

20 4. The caller generated system of Claim 3 wherein said voice mail messaging system includes the manual retrieval of voice messages by a user of said apparatus.

5. The caller generated system of Claim 3 wherein said voice mail messaging system comprises an automatic call back to the apparatus upon

25 completion of a connection with the user so that the stored voice mail message is automatically played back without prompting by the user.

6. The caller generated system of Claim 3 wherein said means for enabling a user to leave a voice mail associated with the user's apparatus comprises a recording means contained within the apparatus which can be accessed by a switch

30 contained on the apparatus.

7. The caller generated system of Claim 1 further comprising a means for a caller to leave at least one of a numerical message and voiced message and means for displaying said message on the apparatus.

8. A method for caller generated two way wireless communication with
5 caller generated billing comprising the steps of:

- a) initiating a call from at least one of a telephone and a wireless radio system to an apparatus having means for receiving a pager signal;
- b) receiving said pager signal with said apparatus;
- 10 c) processing said pager signal to transmit a radiotelephone signal to said at least one of a telephone and a wireless radio system;
- d) receiving said radiotelephone signal with said apparatus to create
15 a two-way wireless communication between a user of the apparatus and a user of the at least one of a telephone and a wireless radio system;
- e) measuring an amount of time during which said two-way wireless communication occurs;
- f) calculating a billing amount for said measured amount of time;
20 and
- g) billing said billing amount to an account associated with said at least one of a telephone and a wireless radio system.

9. The method of Claim 8 wherein said apparatus having means for receiving a pager signal is incapable of transmitting an outgoing signal to another
25 distinct apparatus.

10. The method of Claim 8 further comprising the step of activating a voice system informing the caller that calling party pays prior to said step of receiving said pager signal with said apparatus.

11. The method of Claim 8 further comprising the step of enabling the caller
30 to leave a voice mail message via a voice mail messaging system that can be accessed when the apparatus is not accessible.

12. The method of claim 8 wherein said billing step further comprises the step of billing at least a portion of said billing amount to a subscriber of the apparatus.

13. The method of Claim 6 further comprising the step of activating a hardware mechanism contained on the apparatus to retrieve a message recorded by the apparatus.

14. The caller generated system of Claim 1 further comprising means for recording and storing a message from the recipient within the apparatus.

15. The caller generated system of Claim 14 further comprising:

10 means to enter and store at least one of a predetermined telephone number and an emergency telephone number; means for retrieving and transmitting said telephone numbers such that a wireless connection is made between said apparatus and communication apparatus associated with said telephone numbers; and
15 means for transmitting said recorded message only from said apparatus to said communication apparatus associated with said telephone numbers.

16. The method of Claim 8 further comprising the steps of:

20 pre-recording a message from the user of the apparatus; entering and storing at least one of a predetermined telephone number and an emergency telephone number; activating a switching mechanism to result in a connection between said apparatus and a communication apparatus associated with at least one of said telephone numbers;
25 and transmitting said pre-recorded message upon connection between said apparatus and said communication apparatus associated with at least one of said telephone numbers.

17. The method of Claim 16 further comprising the step of terminating the connection and returning the apparatus to a sleep state upon completion of the transmission of the pre-recorded message.

18. The method of Claim 16 wherein said step of activating a switching
5 mechanism to result in a connection comprises the steps of:

closing at least one of a predetermined telephone number switch
and an emergency telephone number switch;

accessing a memory of a microprocessor to retrieve at least one
of the stored telephone numbers;

10 sending a signal from the apparatus to at least one of the
retrieved telephone numbers.

19. The method of Claim 18 wherein the step of sending said signal includes the step of sending said signal through a mobile telephone switching office.

20. An radiotelephone transceiving apparatus for caller only initiated two-
15 way wireless communication with caller generated billing comprising:

a housing having receiving means for receiving radiotelephone
signals;

transmission means for transmitting radiotelephone signals
whereby said transceiving apparatus may only be used to
20 supervise a real time two-way voice communication
initiated from another telephone apparatus;

switching means for activating a switch for at least one of a
predetermined telephone number and an emergency
telephone number;

25 processing means coupled to the transmission means, to the
receiving means and to the switching means, said
processing means processing received signals and only
transmitting radiotelephone signals in response to receipt
of a signal having a correct mobile identification number of
30 said transceiving apparatus and radiotelephone signals
associated with said telephone numbers associated with

said switching means wherein only a pre-recorded message may be transmitted to said telephone numbers and no real time communication may be initiated between the user and a caller; and

5

means for indicating reception of radiotelephone signals coupled to said processing means.

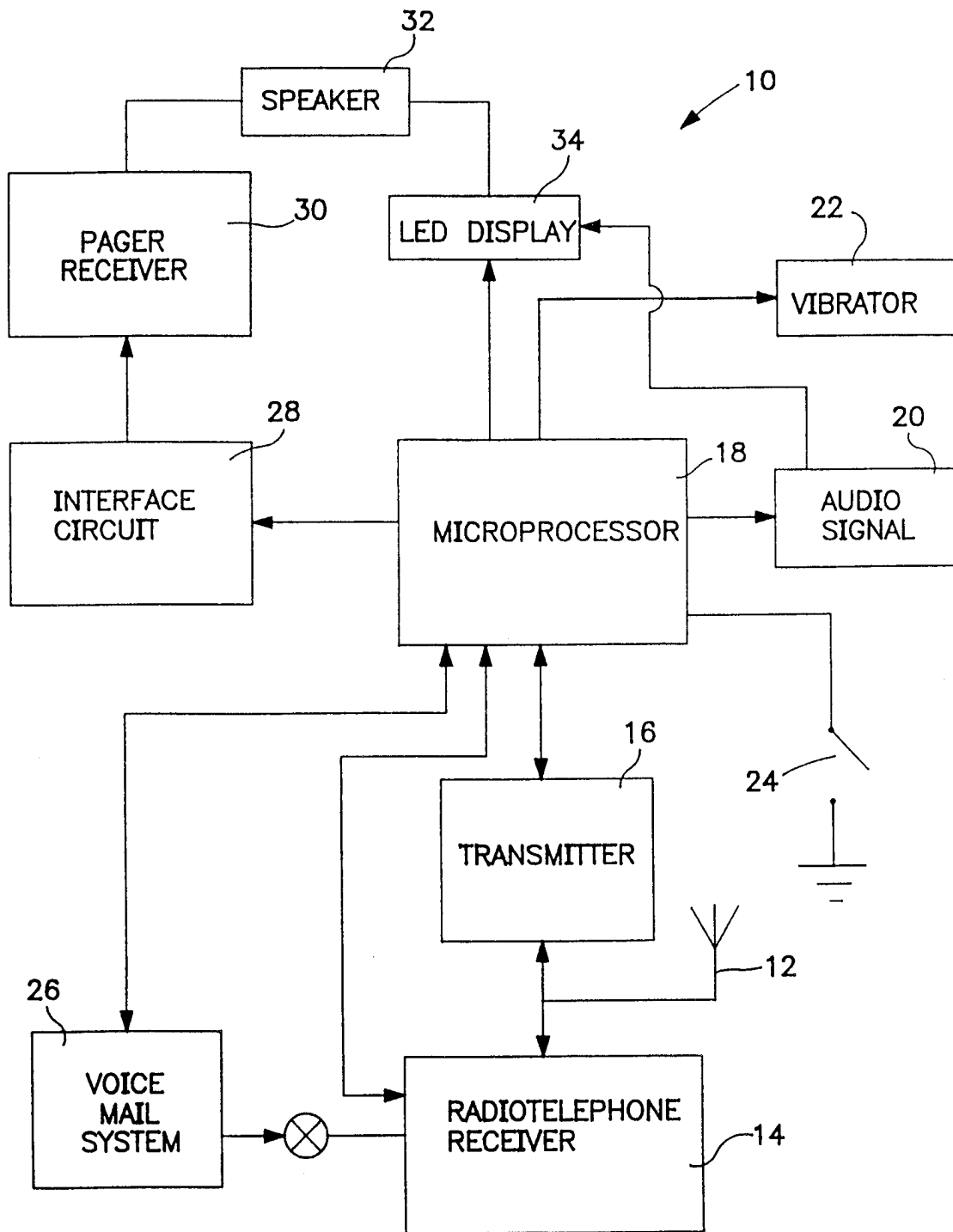


FIG. 1A

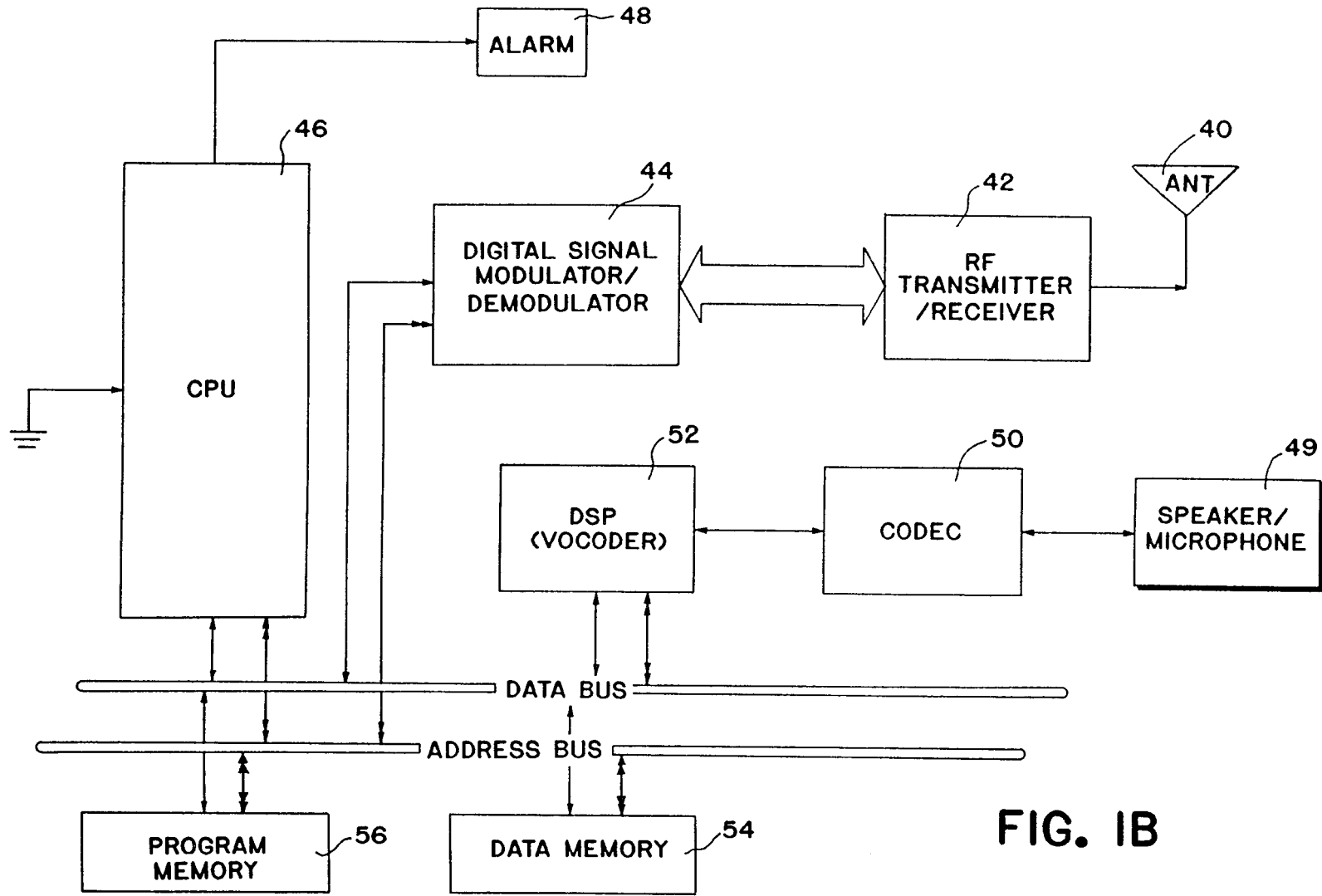


FIG. 1B

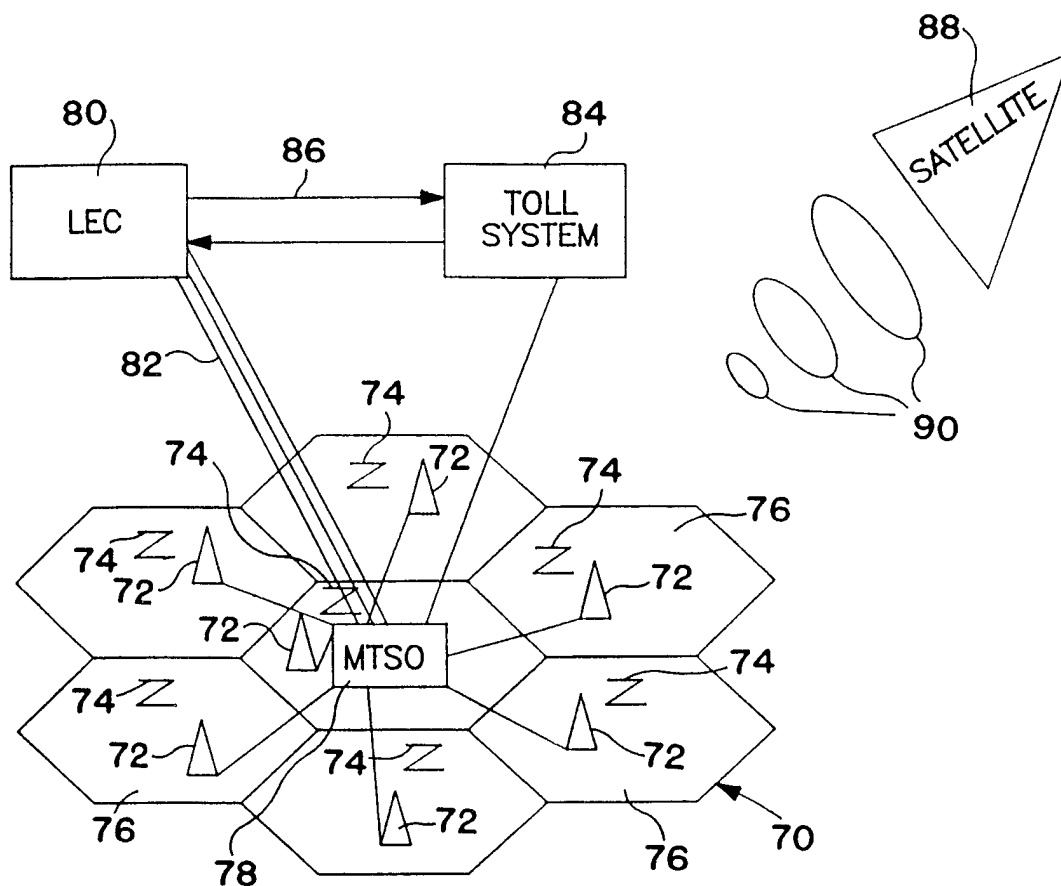


FIG. 2

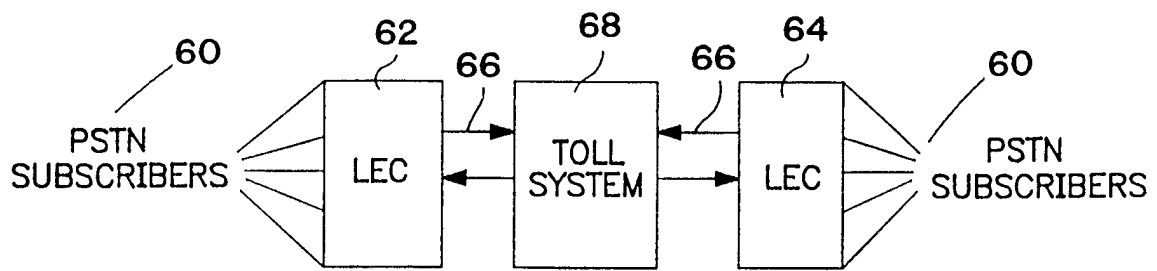


FIG. 3

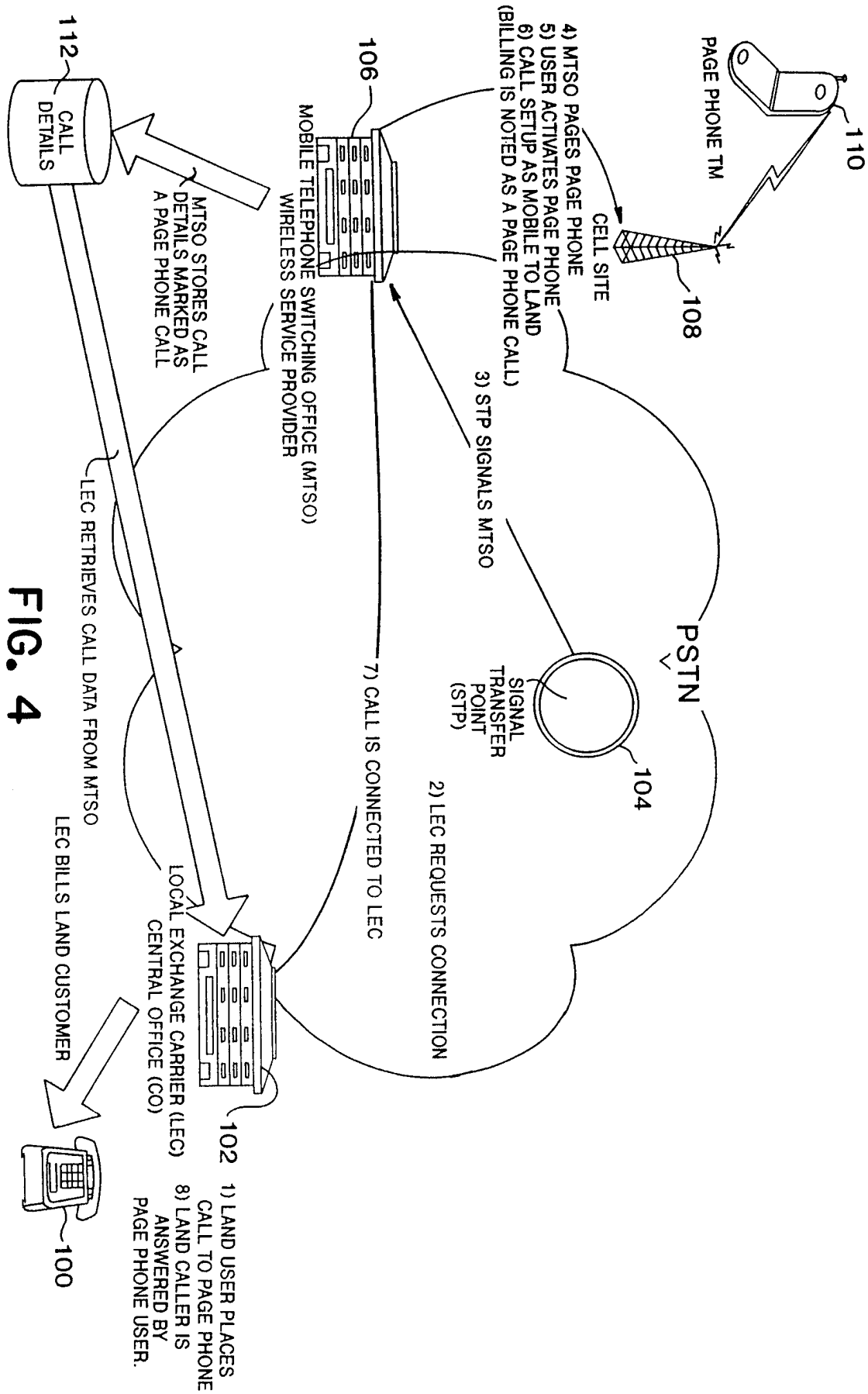


FIG. 4

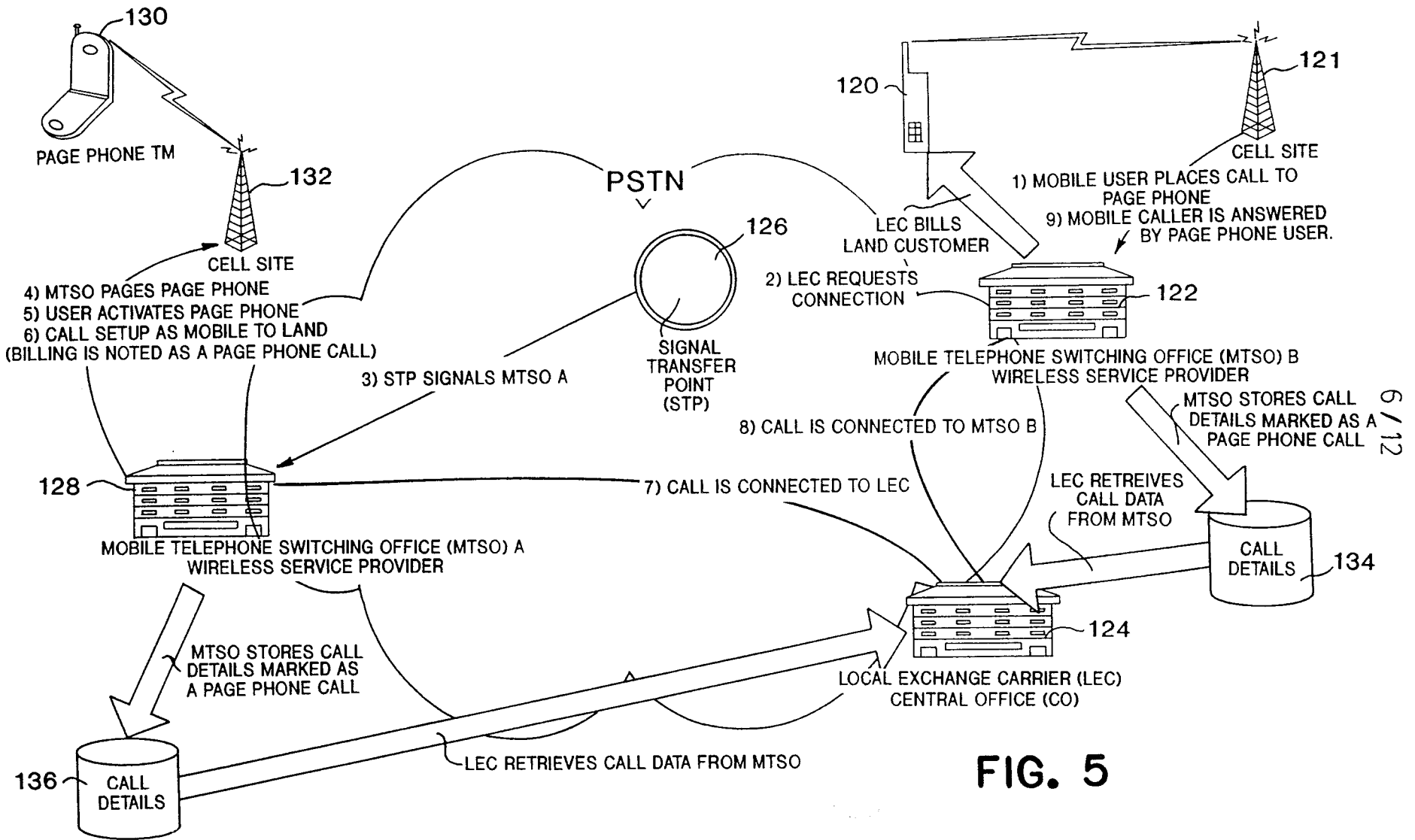


FIG. 5

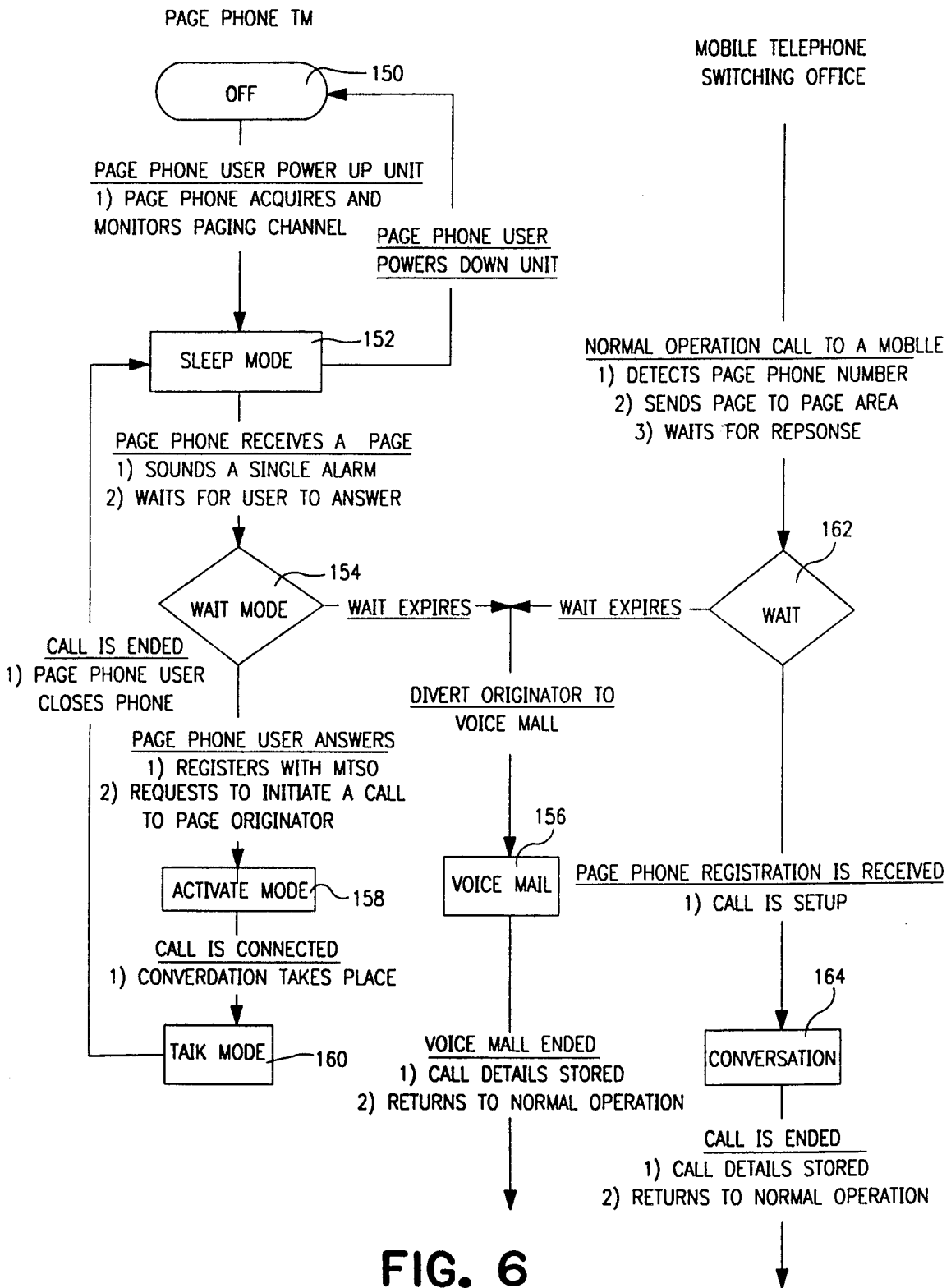


FIG. 6

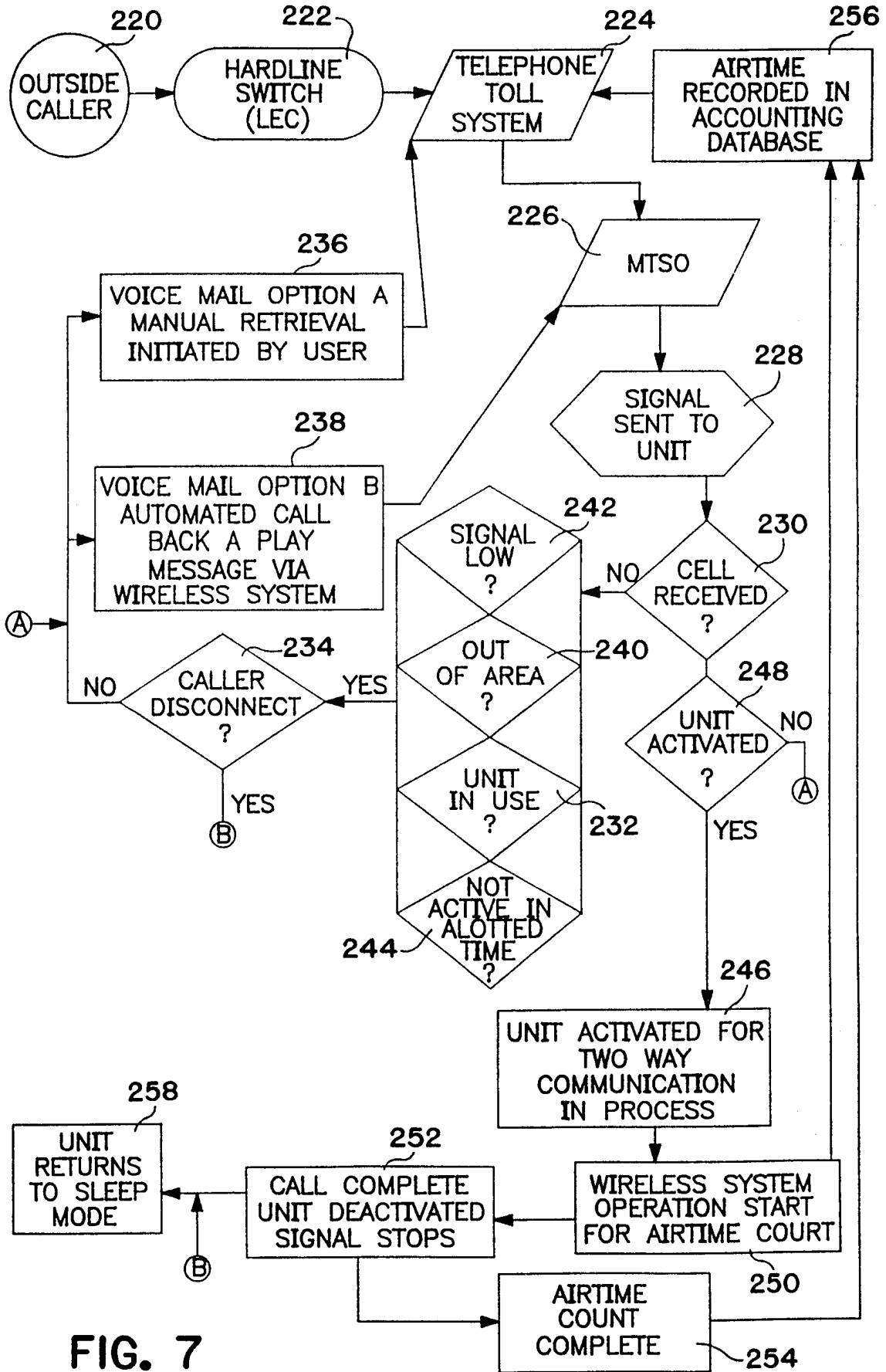


FIG. 7

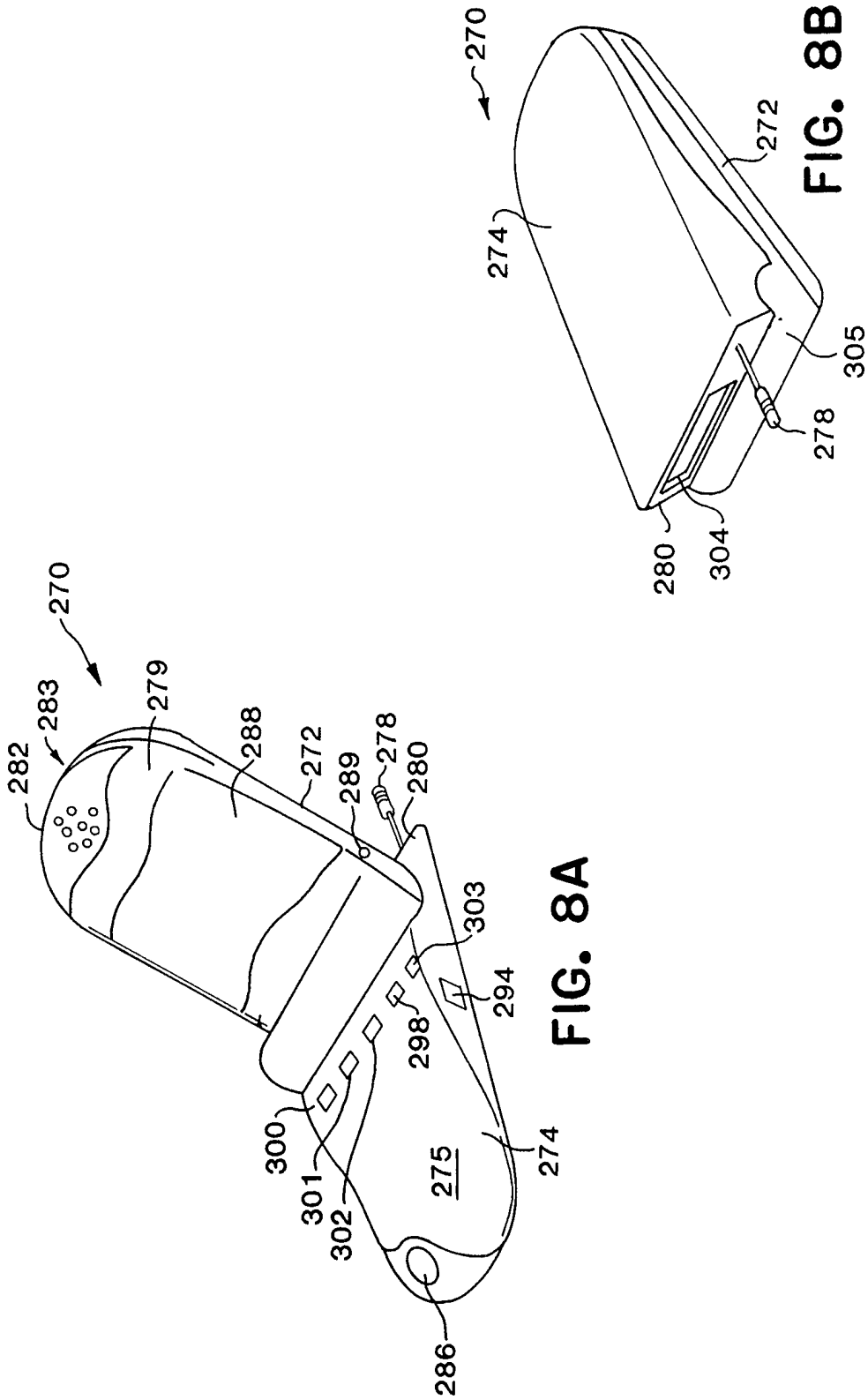


FIG. 8A

FIG. 8B

10 / 12

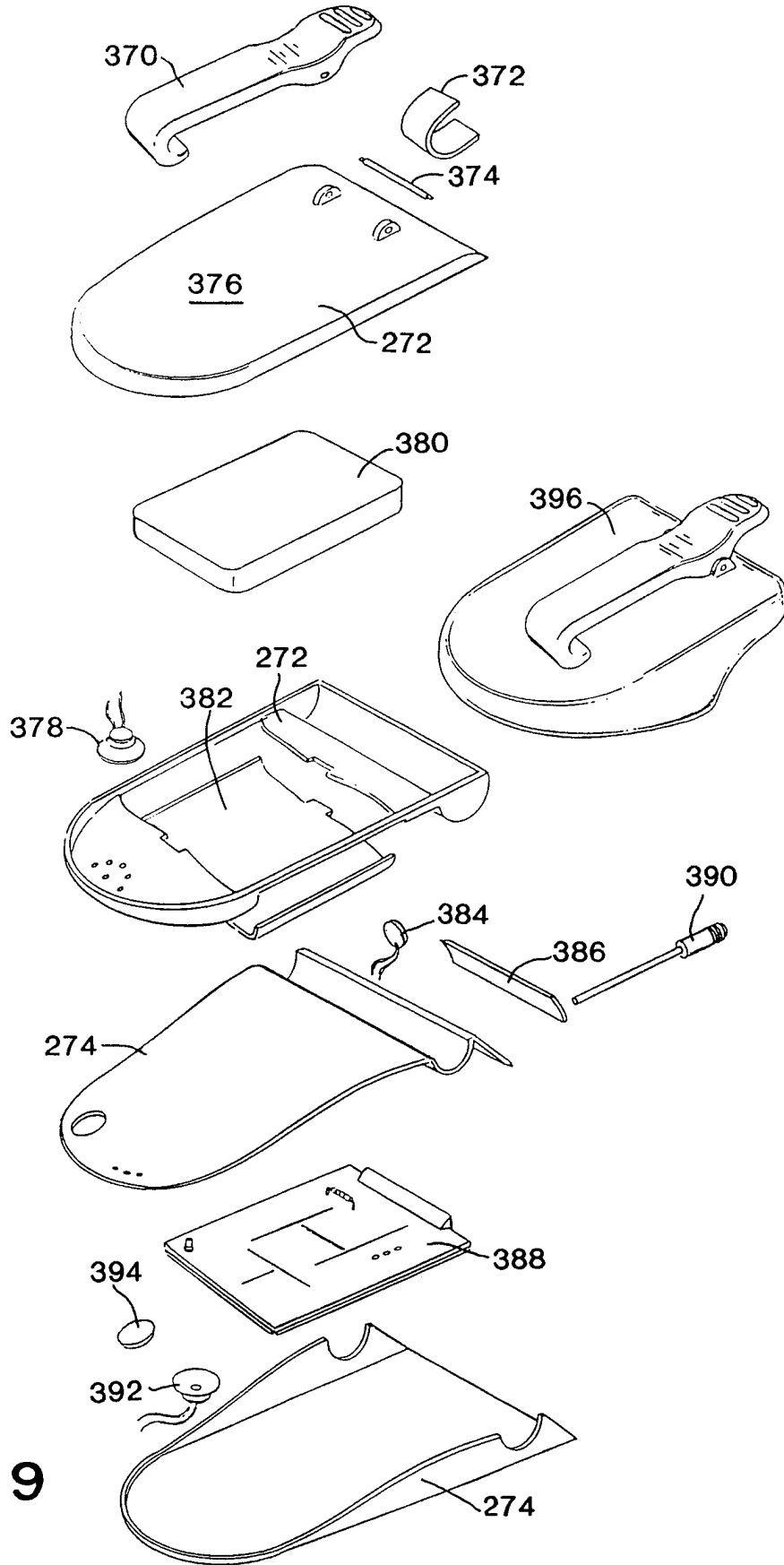


FIG. 9

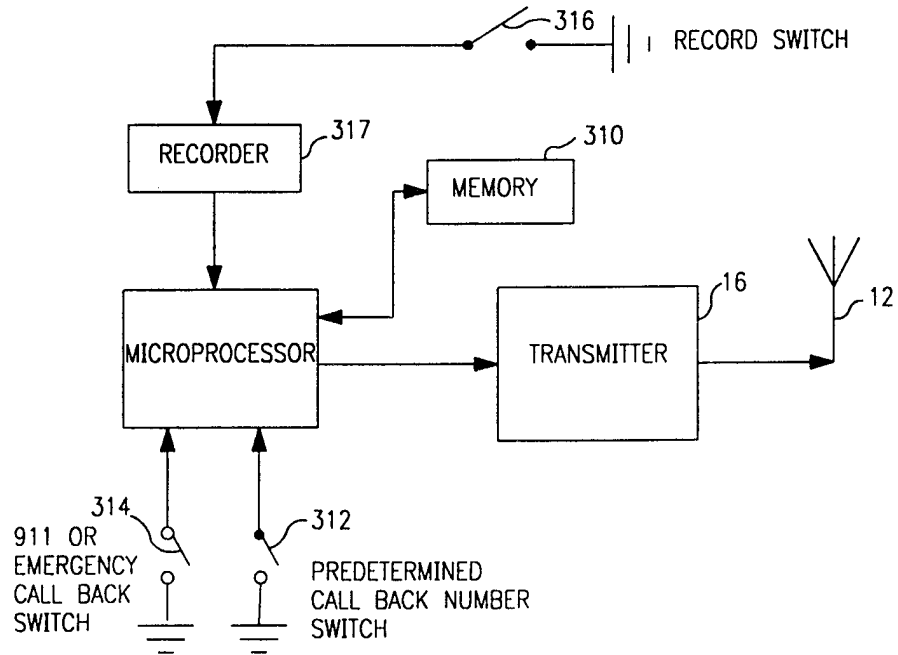


FIG. 10

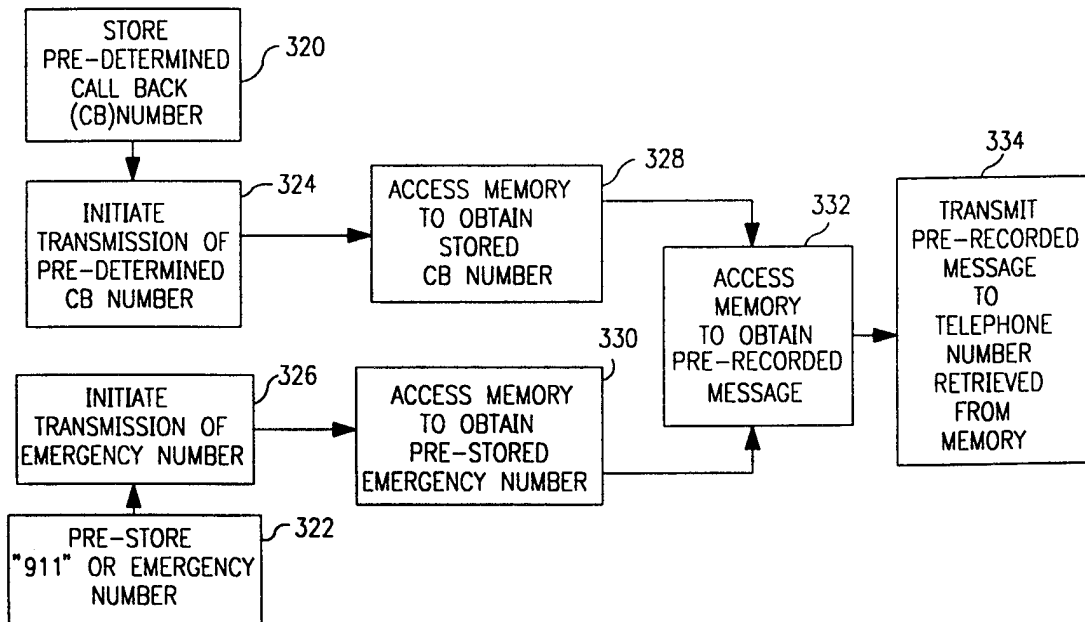


FIG. II

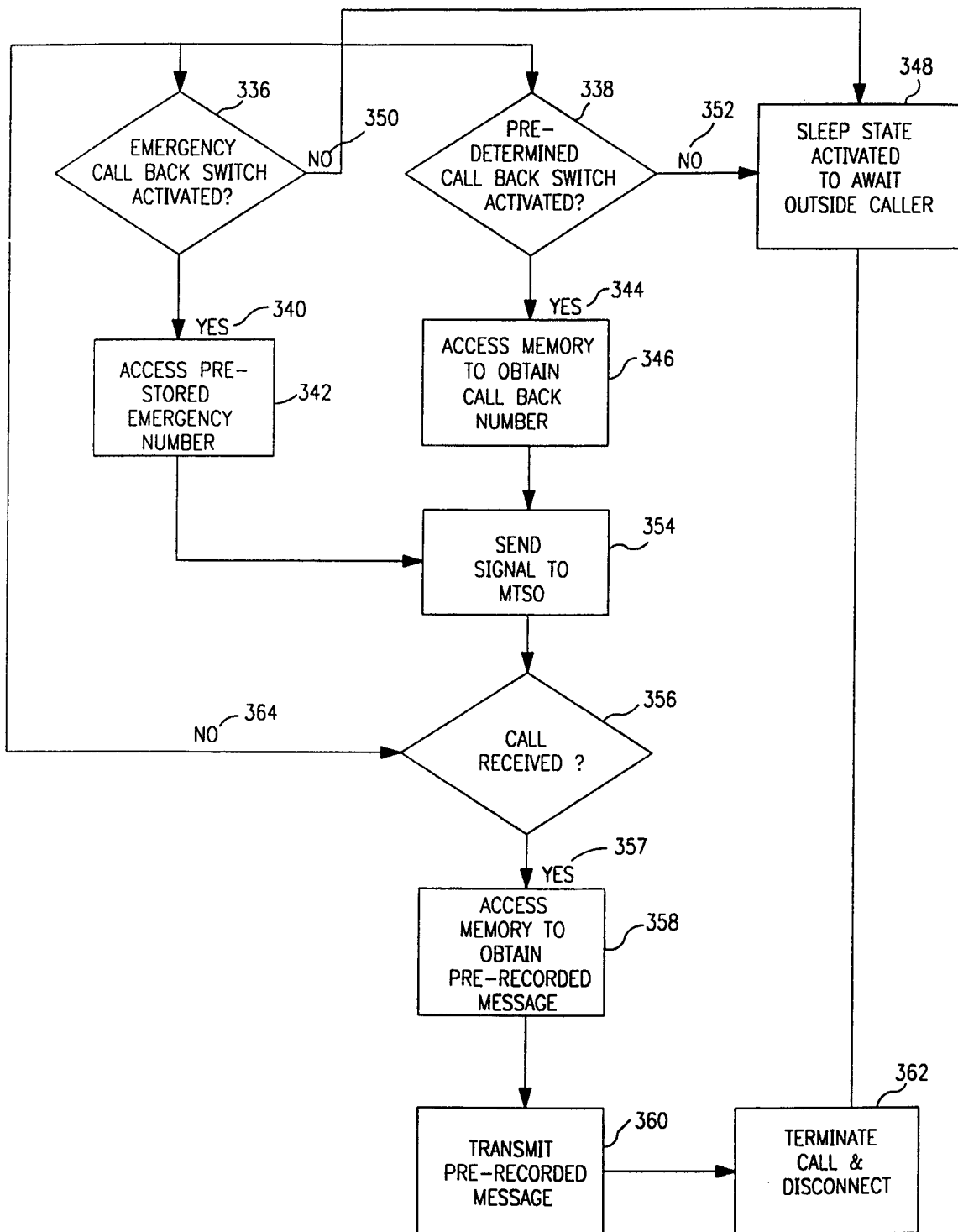


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/10339

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :H04Q 15/00
US CL : 455/406
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)
U.S. : 455/406,407, 408, 412, 413, 414, 460, 31.2, 31.3, 557, 556, 567, 575

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

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


C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,479,482 A (GRIMES) 26 DECEMBER 1995, ABSTRACT	15, 16, 18, 19,
A	US 5,303,297 A (HILLIS)12 APRIL 1994, (see abstract)	1-20
A	US 5,574,772A (SCALISI ET AL.) 12 NOVEMBER 1996, see column 3, lines 1 through column 5, line 60	1-20
A	US 5,749,052A (HIDEM et al.) 5 MAY 1998, see column 11, line 58 through column 12, line 59.	1-20
Y, P	US 5,491,739A (WADIN et al.) 12 FEBRUARY 1996, see figures 5 and 3.	1-20

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier document published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 20 AUGUST 1998	Date of mailing of the international search report 16 OCT 1998
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