

EXHIBIT 4



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(54) **MULTIPLE PAGER STATUS SYNCHRONIZATION SYSTEM AND METHOD**

VERFAHREN UND VORRICHTUNG FÜR DIE STATUSSYNCHRONISATION EINER GRUPPE VON
FUNKRUFEMPFÄNGERN

SYSTEME ET PROCEDE DE SYNCHRONISATION DES ETATS DE RECEPTEURS DE
TELEAPPELS MULTIPLES

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(56) References cited:
EP-A- 0 341 609 **EP-A- 0 372 640**
GB-A- 2 280 976 **US-A- 4 951 044**

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Description

Field of the Invention

[0001] This invention relates generally to the field of two-way communication devices and, in particular, to information managed therein.

Background of the Invention

[0002] As the acceptance of selective call communication devices, or pagers, including two-way pagers, continues to grow, and as their affordability continues to improve, some users are acquiring pagers which have a same selective call address. Pagers come in different form factors or colors to complement a user's attire. Thus, the user carries one pager at one time with one apparel outfit and another pager at another time with another outfit. For example, a neon colored belt worn pager is used for a day at the beach, and a black and gold pen pager with a business suit is used for an evening business meeting.

[0003] Reductions in battery power consumption technology have resulted in substantial improvement in battery life of a pager. Thus, it is feasible for a user to leave a pager on twenty-four hours per day to assure continuous reception of paging messaging while also maintaining an acceptable battery life.

[0004] However, a problem arises when the user has multiple pagers which are left continuously on. For example, messages received by a pager carried by a user are also received by the user's other pagers which are not carried at that time. Disadvantageously, with known pagers, message status changes made by the user on the carried pager are not made on the user's other pagers. If a user reads, deletes, or protects a message on the carried pager, the message remains as an unread message on the user's other pagers. Thus, when the user changes attire and corresponding pagers, the user is faced with a different pager having messages with an unread status, which are identical to messages previously read, deleted or protected on another pager. Thus, the user must again read and decide the status of each message received on the other pager. This additional tedious task required after each change of a pager poses an inconvenience to the user that could deter a user from acquiring a number of pagers in different form factors and colors. Thus, what is needed is a way to have message status changes made on any one of the user's pagers automatically made on the user's other pagers.

[0005] A similar problem arises when the user has multiple pagers and the user changes configuration information stored in one of the pagers, as, for example, when the user changes, on the carried pager, the time of a daily alarm, or the type of alert produced when a message from a certain user or a message having a certain content is received. The latter situation occurs when the user subscribes to an information service that com-

municates many news items. For this kind of service, the user may desire an audio alert when specific items of information are received. Examples include changes in the value of a financial instrument or a key word or phrase indicative of a popular news item. Typically, a user wants the configuration of the interface on each of the user's pagers to be substantially identical in order to maintain a familiarity with the interface. However, the user of several pagers would be inconvenienced with having to change the configuration information stored in each of the pagers.

[0006] Personal paging systems that automatically determine the status of a pager are known. For example, European patent application having publication number 0372640 A1 describes a paging system in which a pager automatically transmits its status by transmitting a report signal to the central receiver of the paging system in response to the pager receiving a paging signal having an identification code corresponding to a stored identification code assigned to the pager and a query code transmitted by the central transmitter of the paging system.

[0007] Thus, what is needed is a way to have status changes to a pager configuration made on any one of a plurality of the user's pagers automatically made on the other one or ones of the plurality of the user's pagers.

Summary of the Invention

[0008] In accordance with one aspect of the present invention, there is provided a method of synchronizing message information among a plurality of transceivers comprising the steps of:

transmitting by a wireless messaging infrastructure a first message having a first status;
in one transceiver of the plurality of transceivers, changing the first status of the first message to a second status responsive to an input to the one transceiver, and transmitting a second message indicative of the second status;
in the wireless messaging infrastructure, receiving the second message; and
characterised in that the method includes the steps of in the wireless messaging infrastructure, responsive to receiving the second message, transmitting a third message indicative of the second status; and in at least one other transceiver of the plurality of transceivers, receiving the third message, and responsive to receiving the third message, changing the first status of the first message to the second status.

[0009] In accordance with a second aspect of the invention, there is provided a method of synchronizing a status of a plurality of transceivers comprising the steps of:

in a first transceiver,

changing the status of the first transceiver from a first status to a second status as a result of an input from a user, and transmitting a first message indicative of the second status;

in a wireless messaging infrastructure,

receiving the first message, characterised in that the method includes the steps of, in the wireless messaging infrastructure, transmitting a second message indicative of the second status; and

in a second transceiver,

receiving the second message, and changing a status of the second transceiver to the second status in response thereto.

[0010] In accordance with a third aspect of the invention, there is provided a system for synchronizing a status category of a plurality of communication devices communicating with an infrastructure, each of the plurality of communication devices having at least one status category, each of the at least one status category having a plurality of states, characterised by:

means in at least one communication device of the plurality of communication devices for changing a status category of the at least one communication device of the plurality of communication devices to produce a current state of the status category;

means in the at least one communication device of the plurality of communication devices to produce a synchronizing signal for signaling to the infrastructure the current state of the status category;

means in the infrastructure to produce a current state signal for signaling to an other communication device of the plurality of communication devices the current state of the status category of the at least one communication device of the plurality of communication devices in response to the synchronizing signal; and

means in the other communication device of the plurality of communication devices for changing the current state of the at least one status category of the other communication device of the plurality of communication devices to the current state of the at least one communication device of the plurality of communication devices responsive to the current state signal.

Brief Description of the Drawings

[0011]

5 FIG. 1 is a flow diagram of a system and method for synchronizing messages of multiple pagers operating in accordance with a preferred embodiment of the present invention.

10 FIG. 2 is a simplified signalling diagram of fields of a first message shown symbolically in FIG. 1.

FIG. 3 is a simplified signalling diagram of fields of a second message shown symbolically in FIG. 1.

FIG. 4 is a simplified signalling diagram of fields of a third message shown symbolically in FIG. 1.

15 FIG. 5 is a flow diagram of a system and method for synchronizing status of multiple pagers operating in accordance with the preferred embodiment of the present invention.

20 FIG. 6 is a simplified signalling diagram of fields of a message, shown symbolically in FIG. 5, transmitted by a pager, for changing status of another pager in accordance with the preferred embodiment of the present invention.

25 FIG. 7 is a simplified signalling diagram of fields of a message, shown symbolically in FIG. 5, transmitted by an infrastructure, for changing status of the other pager in accordance with the preferred embodiment of the present invention.

30 Description of the Preferred Embodiment

[0012] FIG. 1 shows a flow diagram 100 of a system and method for synchronizing messages of multiple selective call transceivers, or two-way pagers, operating in accordance with the present invention. The invention preferably operates with a two-way paging communication system that allows communication both to and from pagers such as the system described in U.S. Patent No. 5,168,493 entitled "Time Division Multiplexed Selective Call System" issued December 1, 1992 to Nelson et al., assigned to the assignee of the present invention. The invention preferably operates with the Motorola Reflex™ two-way wireless paging system infrastructure and protocol described in detail in the following United States patents assigned to the assignee of the present invention: U. S. Patent No. 5,475,863 entitled "Method and Apparatus for Identifying a Transmitter in a Radio Communication System" issued December 12, 1995 to Simpson et al.; U. S. Patent No. 5,712,624 entitled "Method and Apparatus for Optimizing Receiver Synchronization in a Radio Communication System" issued January 27, 1998 to Ayerst, et al.; U.S. Patent No. 5,521,926 entitled "Method and Apparatus for Improved Message Reception at a Fixed System Receiver" issued May 28, 1996 to Ayerst et al.; U. S. Patent No. 5,638,369 entitled "Method and Apparatus for Inbound Channel Selection in a Communication System" issued June 10, 1997 to Ayerst et al.; and U. S. Patent No. 5,737,691

entitled "A System and Method for Allocating Frequency Channels in a Two-way Messaging Network" issued April 7, 1998 to Wang et al. It should be appreciated that other two-way communication systems are also contemplated.

[0013] A communication system in accordance with the preferred embodiment of the present invention comprises a fixed portion and a portable portion. The fixed portion comprises a wireless messaging infrastructure, or infrastructure, 110 that provides interfacing between a pager and typically a public switched telephone network (PSTN) for communication of information with the pager. The operation of infrastructure 110 is well known to those skilled in the art. Preferably, infrastructure 110 is a Motorola ReFlex™ infrastructure modified to perform the operations shown in dotted-line box 104. The fixed portion includes at least one base station, for communicating with the portable portion, utilizing the ReFlex™ protocol and coupled by communication links to a controller that controls the at least one base station. The hardware of the controller preferably includes a Wireless Messaging Gateway (WMG™) Administrator!™ paging terminal, a RF-Conductor!™ message distributor, and a RF-Usher!™ multiplexer, manufactured by Motorola, Inc. The controller has software elements and preferably runs under a UNIX operating system. The hardware of the base station preferably includes a Nucleus® Orchestra!™ transmitter and a RF-Audience!™ receiver, manufactured by Motorola, Inc. A more detailed description of the hardware of the system controller and of the base station is described in "Introduction to the Wireless Concert!™", published by Motorola, Inc., which is available for sale to the public as Part No. 6880491G01, from Motorola Paging Products Group, Fort Worth, Texas. It will be appreciated that other similar hardware can be utilized for the system controller and base stations.

[0014] Each of the at least one base station transmits or receives radio signals to or from the portable portion via antennas. The radio signals comprise selective call addresses and message transactions between the base stations and the pagers. The controller preferably is coupled by conventional telephone links to PSTN for receiving selective call messages, i.e., messages intended for one or more pagers. The selective call messages comprise voice and data received from the PSTN using, for example, a conventional telephonic-type device or a computer-type device coupled to the PSTN in a manner well known in the art.

[0015] The portable portion comprises a plurality of paging transceivers such as pager 130 and 150. Each paging transceiver includes a transmitter and a receiver. The operation of a paging transceiver is well known in the art and is described more fully in U.S. Patent No. 5,124,697 entitled "Acknowledge Back Pager" issued June 23, 1992 to Moore; U.S. Patent No. 5,153,582 entitled "Method and Apparatus for Acknowledging and Answering a Paging Signal" issued October 6, 1992 to

Davis; and U.S. Patent No. 4,875,038 entitled "Frequency Division Multiplexed Acknowledge Back Paging System" issued October 17, 1989 to Siwiak et al., which are assigned to the assignee of the present invention. The paging transceiver, pager 130, is preferably a Motorola Tango™ pager and has a microprocessor, or processor, modified to perform the operations shown in dotted-line box 106. The Motorola Tango™ pager is compatible with the ReFlex protocol. The Tango pager is described more fully in the *Motorola Product Family 255 Service Manual* published 1995 by Motorola, Inc., and in the *Motorola Product Family 255 Series Controller Supplement*, published 1995 by Motorola, Inc., which are available for sale to the public from Motorola Paging Products Group, Boynton Beach, Florida as part No. 6881024B80 and part No. 68881104B36, respectively. Pager 150 is alternatively a receive-only pager, the operation of each of which are well known to those skilled in the art. A software element, residing in memory, preferably read-only memory (ROM), of pagers 130 and 150 is modified to operate the microprocessor, preferably a Motorola M68HC11PH8, within the pager in accordance with the description of FIG. 1. A person skilled in the art of programming modifies the software using a *Motorola HC11 Reference Manual*, published 1991 by Motorola, Inc., and using a *Motorola MC68HC11PH8 Technical Data*, published 1995 by Motorola, Inc., Part No. M68HC11RM/AD and Part No. MC68HC11PH8/D, respectively, which are available for sale to the public from Motorola Literature Distribution, Phoenix, Arizona.

[0016] Referring to FIG. 1, dotted-line box 104 encloses a paging infrastructure 110 and steps performed by the paging infrastructure 110; dotted-line box 106 encloses a pager 130 worn by the user and steps performed by pager 130; and clotted-line box 108 encloses at least one pager 150 assigned to the user, but not worn by the user, and steps performed by pager 150. In accordance with the invention, infrastructure 110 receives information intended for the user of pagers 130 and 150. In step 200 a first message 205 having information is wirelessly transmitted and is received by pagers 130 and 150 in steps 210 and 215, respectively. The pagers assign a status to each message. Immediately after reception, the status of the message in both pagers is "unread".

[0017] FIG. 2 shows an example of a first message, or message 205, which includes an address 206 assigned to pagers 130 and 150 for selectively identifying the pagers, a message number 207 assigned by the infrastructure 110 for identifying the message, and message information 208 for communication to the user of pagers 130 and 150. Message 205 is a forward channel message transmitted by the infrastructure for reception by one or more pagers.

[0018] Referring again to FIG. 1, in step 220, pager 130 receives an input from the user: typically the user interacts with a user interface by depressing a button on the pager indicating a desire to read the message. The

message is then displayed on a pager display so that the user is able to read the message. The act of depressing the button causes the status of message 205 to change from "unread" to "read" in pager 130. During a delay 230, additional changes to message status can occur. The duration of delay 230 is a predetermined time period such as a typical display time out interval where the pager enters a low power mode when message displaying is ended. Other status changes that can occur during the delay 230 include changes to protected or deleted status. After delay 230, the status of the message received by pager 130 is transmitted in step 235 via a second message, that is, message 240.

[0019] FIG. 3 shows an example of a second message, or message 240, that includes an address 241, corresponding to address 206, assigned to both pager 130 and pager 150 for selectively identifying the pagers; a message number field 242 assigned by the infrastructure 110 for identifying the number of the message; a status change information field 243 for indicating the status change occurring in step 220 and in delay 230, and an origin field 244 for uniquely identifying the pager 130 which is the source of message 240. Message 240 is a synchronizing signal in a forward channel message transmitted by a pager for reception by the infrastructure. The status change information field 243 comprises, in this embodiment, a status change control signal indicating that status change information (rather than some other type of information) follows, and three bits of status change information: a read/unread bit, a protect bit, and a delete bit. These three bits indicate the corresponding status of the identified message. Alternatively, message 240 has a plurality of message number field 242 and status change information field 243 for communicating changes to multiple messages made during step 220 and delay 230.

[0020] Infrastructure 110 receives message 240 at step 245. The message is then submitted to a message queue of the infrastructure 110 for transmission by the infrastructure. In step 250, the infrastructure transmits the status of the first message via a third message, or message 255. Message 255 is a forward channel message. FIG. 4 shows the content of message 255 to be substantially identical to message 240. Message 255 has an address field 256 and a message number field 257. Message 255 is received by pager 130 in step 260 and ignored by pager 130 because it was the source of the message. This determination is made by comparing the origin field 259 of message 255 with that assigned to the pager. Message 255 is also received by pager 150 in step 265. Pager 150 determines that message 255 has status change information due to the status change control signal included in status change field 258, and that, in this example, the status change information applies to message 205 in response to message 240. In response, pager 150 changes the status of the first message 205 to correspond to the status set by the user placing inputs to pager 130 at step 220 and delay

230.

[0021] Thus, the status of messages received by pagers 130 and by all pagers 150 will be identical after execution of step 275. Thus if a user reads and deletes a message on pager 130, it will also be identified as being read and deleted on pager 150. Consequently, when the user changes from pager 130 to 150 in response to changing attire, or otherwise, the status of messages in both pagers will be substantially identical. This has the advantage of alleviating the inconvenience of changing the status of unread messages in pager 150.

[0022] Furthermore, delay 230 has the advantage of reducing the number status change transmissions. For example, when a user receives a message, the first action taken is to read the message. Without delay 230, message 240 and message 255 would be transmitted indicating a change from "unread status" to "read status". This status change would then occur in pager 150. A short time after having read the message the user may either protect or delete the message, and again, message 240 and message 255 would be transmitted indicating a change from the "read" status to the "protect" or "delete" status. When delay 230 is added and if the second status change occurs within the delay interval of delay 230, only a single set of messages consisting of message 240 and message 255 is transmitted indicating a change in message status from "unread" to "protect" or "delete". Thus, in this example, delay 230 reduces by 50% the amount of messages communicated in the paging system in order to keep the pager 130 and the pager 150 synchronized. This has the advantage of reducing the loading of the infrastructure caused by messages sent in accordance with this invention.

[0023] FIG. 5 shows a flow diagram 500 of a system for synchronizing status of multiple pagers operating in accordance with the present invention. As in FIG. 1, the system preferably operates with the Motorola ReFlex™ two-way wireless paging system infrastructure that allows communication both to and from the pager. It should be appreciated that other two-way communication systems are also contemplated. Referring to FIG. 5, box 504 shows a paging infrastructure 510, box 506 shows a pager 530 worn by the user, and box 508 shows at least one pager 550 assigned to the user but not worn by the user.

[0024] Infrastructure 510 is a paging infrastructure that provides interfacing between a pager and typically a PSTN for communication of information with the pager. The operation of infrastructure 510 is well known to those familiar with the art. Preferably, infrastructure 510 is a Motorola ReFlex™ infrastructure, the software of which is modified to perform the operations shown in dotted-line box 504. Pager 530 is a transceiver capable of receiving and sending information and is preferably a Motorola Tango™ pager modified to perform the operations shown in dotted-line box 506. Pager 550 is alternatively a receive-only pager, operation of which is well known to those skilled in the art. The software of

paggers 530 and 550 is modified to operate in accordance with the description of FIG. 3.

[0025] In accordance with the invention, at step 620, pager 530 receives an input from the user. Typically, the input occurs when the user depresses a button on the pager indicating a desire to change the status of the pager. The status of the pager is then changed in response to a sequence of button depressions. A status change includes a change in operating mode or information content of the pager. Changes in operating mode include changes in alert mode, such as changing a time of day alarm, changing from silent to audio alert mode, or selecting a different alert melody. Changes in operating mode also include changes in the status of a message, such as "unread", "read", "protect", and "delete" status of a message. Changes in operating mode also include changes in alert threshold information such as high or low values of a financial instrument information, sports scores, or other information received via an information paging service. Changes in operating mode also include changes in information content such as edits to received or stored information, additional information such as additions to Rolodex™ type information or calendar appointments. Changes in operating mode also include changes in key word search algorithms which search received information for desired words and generate a response such as generating an alert or storing the message having the key word. Implementation of the aforesaid status changes is well known to those skilled in the art of portable information managers such as paggers.

[0026] It is possible that during delay 630, additional changes to pager status will occur. The duration of delay 630 is a typical display time out interval where the pager enters a low power mode when displaying is ended. Any multiple pager status changes that occurred during delay 630 are transmitted in step 635 via a first message 640.

[0027] Status changes are stored as a reconfiguration of memory, preferably random access memory (RAM), in pager 530. Message 640 communicates the change in status by communicating a reconfiguration of memory in pager 530. In a preferred embodiment, paggers 530 and 550 have a common virtual memory structure, the virtual memory structure facilitating communication of status change information by communicating changes in pre-defined records in the common virtual memory structures. The virtual memory structure allows the physical memory structure to vary between paggers while maintaining a common virtual structure. Thus, the change in status of pager 530 is able to be communicated by identifying at least one record, and its contents, in its virtual memory that has been modified by the status change or changes occurring during step 620 and delay 630. For example, record one could contain the alert mode of the pager, record two could contain a time of day alarm, record three could contain a message number and its status, record four through seven could contain the message associated with record one, record

eight could contain a key word search term, and record nine could contain high and low search limits within a message. In alternate embodiments, other techniques may be used to indicate changes in the status of the pager.

[0028] FIG. 6 shows the structure of message 640, having an address field 641 for identifying paggers 530 and 550, a memory record identifier, or virtual memory address, in field 642 for indicating which memory record was affected by the status changes occurring during step 620 and delay 630, the contents of the changed memory record, 643, and an origin field 644 for uniquely identifying pager 530 as the source of message 640. Alternatively, message 640 contains a plurality of field 642 and a plurality of field 643 for indicating a plurality of status changes occurring during step 620 and delay 630. Infrastructure 510 receives message 640 at step 645, and in step 650 transmits the change of status of pager 530 via a second message, message 655.

[0029] FIG. 7 shows the structure of message 655, having an address field 656 for identifying paggers 530 and 550, a memory record identifier 657 for indicating which memory record was affected by the status changes occurring at step 620 and delay 630, the contents of the changed memory record, 658, and an origin field 659 for uniquely identifying pager 530 as the source of the status change. The structure of message 640 shown in FIG. 6 appears substantially identical to the structure of message 655 shown in FIG. 7; however, it should be understood that only the information content conveyed by the messages 640 and 655 are substantially identical, and that the encoding scheme and the manner of inserting the message into the ReFlex protocol is preferably different for transmissions made by a pager compared with transmissions made by the infrastructure. Message 640 is transmitted by pager 130. Message 655 is transmitted by the infrastructure in response to receipt by the infrastructure of message 640.

[0030] Referring now to Fig. 5, message 655 is received by pager 530 in step 660 and ignored since it was the source of the message. Message 655 is also received by pager 550 in step 665. In this step, pager 530 checks the origin field 659, and after establishing itself as the pager that originated the message 655, ignores the message 655. Similarly, pager 550, upon checking the origin field 659 determines that it is not the origin of the status change, and in response, pager 550 changes its status to correspond to the status of pager 530 set by the user placing inputs to pager 530 at step 620 and delay 630. This is done by replacing the status of virtual memory records in the memory of pager 550 with the contents of corresponding one or more field 658, thereby effecting the status change.

[0031] Thus, the status of all of the user's paggers (in this example, pager 530 and pager 550) will be identical upon execution of step 675. Consequently, when the user changes from pager 530 to pager 550 in response to changing attire, or otherwise, the status of both paggers

will be substantially identical.

[0032] Furthermore, similar to delay 230, delay 630 has the advantage of reducing the number of status change transmissions. For example, when a user enters or changes a financial instrument alert threshold, and the user wants an alert when a certain stock reaches a certain value, it is possible that the user changes the threshold several times during the delay interval while deciding upon a final value. Delay 630 only allows transmission of the value preferably after the display times out and enters a battery saving mode. Thus, if the user changes the threshold four times, only a signal indicative of the last threshold entered corresponding to the financial instrument would be transmitted. Consequently, only a single set of messages 640 and 655 is transmitted indicating a status change. Thus, in this example, delay 630 reduces by 75% the amount of messages communicated in the paging system in order to keep the status of pagers 530 and 550 synchronized. Furthermore, since the user is monitoring pager 530 during delay 630, if a financial instrument value is received that exceeds an interim threshold value entered into pager 530, an alert will be generated by pager 530. However, since the interim threshold value was not transmitted to pager 550, no alert would be generated by pager 550. This of no great consequence because the user is monitoring pager 530, and not pager 550, and therefore the user receives the desired alert. The user is thus able to take a desired action, such as ordering the purchase or sale of the financial instrument, based upon the alert. In any event, the user is able to switch from using pager 530 to pager 550 knowing that the financial instrument threshold in both pagers is identically set.

[0033] Similar examples of the advantages of the pause that occurs during the delay 630 include entry of information in a calendar or "Rolodex" information on acquaintances. Delay 630 allows the user to change the entry of information during the delay without transmitting a signal indicative of each iteration of the entered information. This reduces the information loading of the infrastructure in communicating the changes to the status of the user's pagers. Furthermore, since the pager's transmitter is operated less frequently, delay 630 and delay 230 have the advantage of reducing the power consumed by a battery powering the pagers 130 and 530, thereby improving the battery life of the pagers.

[0034] The present invention includes a method of communicating changes in a status of message information in a pager 130 including the steps of: wirelessly receiving a first message from a base station, the first message having first information for a user of the pager and having a status associated therewith; changing the status of the first information responsive to an input to the pager; and wirelessly transmitting a second message having second information indicative of the status of the first information to the base station responsive to the step of changing.

[0035] The invention also includes a method of syn-

chronizing message information among a plurality of transceivers, such as pager 130 and pager 150, including the steps of: transmitting, in step 200, by a wireless messaging infrastructure a first message having a first status; in one transceiver, such as pager 130, of the plurality of transceivers, changing, in step 220, the first status of the first message to a second status responsive to an input to the one transceiver, and transmitting, in step 235, a second message indicative of the second status; in the wireless messaging infrastructure, receiving, in step 245, the second message, and responsive to receiving the second message, transmitting, in step 250, a third message indicative of the second status; and, in at least one other transceiver, such as pager 150, of the plurality of transceivers, receiving, in step 265, the third message, and responsive to receiving the third message, changing, in step 275, the first status of the first message to the second status.

[0036] The invention further includes a method of synchronizing a status a plurality of transceivers, such as pager 530 and pager 550, including the steps, in a first transceiver, of: changing the status, in step 620, of the first transceiver from a first status to a second status as a result of an input from a user, and transmitting, in step 635, a first message indicative of the second status; and also comprising, in a wireless messaging infrastructure, the steps of: receiving, in step 645, the first message, and transmitting, in step 650, a second message indicative of the second status; and further comprising, in a second transceiver, the steps of: receiving, in step 665, the second message, and changing, in step 675, a status of the second transceiver to the second status in response thereto, wherein the first transceiver and the second transceiver have a multiplicity of status categories that include received message status, time of day alarm status, message key word status, or message threshold value status, each of the status categories having a plurality of states, and the first message is a signal indicative of a state of a status category which has changed in response to the input.

[0037] The microprocessor and the software that controls the microprocessor in pager 530 comprise means in at least one communication device of the plurality of communication devices for changing a status category of the at least one communication device of the plurality of communication devices to produce a current state of the status category. The microprocessor, the software that controls the microprocessor, and a transmitter in pager 530 comprise means in the at least one communication device of the plurality of communication devices to produce a synchronizing signal for signaling to the infrastructure 510 the current state of the status category. The receiver, the transmitter, the controller of the infrastructure 510, and the software of the controller comprise means in the infrastructure 510 to produce a current state signal for signaling to another communication device of the plurality of communication devices the current state of the status category of the at least one com-

communication device of the plurality of communication devices in response to the synchronizing signal. The receiver, the microprocessor, and the software of the microprocessor of pager 550 comprise means in the other communication device of the plurality of communication devices for changing the current state of the at least one status category of the other communication device of the plurality of communication devices to the current state of the at least one communication device of the plurality of communication devices responsive to the current state signal.

[0038] Thus, it should be apparent by now that the present invention provides a method of synchronizing the state of message information among a plurality of selective call transceivers, or pagers. In particular, the method advantageously provides a method of communicating changes in status category of message information, from among a multiplicity of status categories, in a first transceiver to a second transceiver. When a first status in a transceiver is changed to a subsequent status as a result of a subsequent input to the first transceiver, the invention provides a method of automatically changing the first status in a second transceiver to the subsequent status.

[0039] While a detailed description of a preferred embodiment of the invention has been given, it should be appreciated that many variations can be made thereto without departing from the scope of the invention as set forth in the appended claims. Further, the invention is not limited to selective call transceivers, or two-way pagers, but can be used with other types of two-way communication devices, both fixed and portable, both wireless and wireline.

Claims

1. A method of synchronizing message information (208) among a plurality of transceivers (130, 150) comprising the steps of:

transmitting (200) by a wireless messaging infrastructure a first message (205) having a first status;
 in one transceiver (130) of the plurality of transceivers, changing (220) the first status of the first message to a second status responsive to an input to the one transceiver, and transmitting (235) a second message (240) indicative of the second status;
 in the wireless messaging infrastructure (110), receiving (245) the second message; and

characterised in that the method includes the steps of in the wireless messaging infrastructure, responsive to receiving the second message, transmitting (250) a third message (255) indicative of the second status; and

in at least one other transceiver (150) of the plurality of transceivers, receiving (265) the third message, and responsive to receiving the third message, changing (275) the first status of the first message to the second status.

2. The method according to claim 2 wherein said step of transmitting (200) the second message indicative of the second status in the one transceiver (130) further comprises the steps of:

delaying (230) transmission of the second message by a predetermined time period after changing (220) the first status of the first message;
 changing (220) the first status of the first message to a subsequent status in response to a subsequent input to the one transceiver; and
 transmitting (235) the subsequent status as the second status if changing of the first status to the subsequent status occurs within the predetermined time period.

3. A method of synchronizing a status of a plurality of transceivers (530, 550) comprising the steps of:

in a first transceiver (530),

changing (620) the status of the first transceiver from a first status to a second status as a result of an input from a user, and
 transmitting (635) a first message (640) indicative of the second status;

in a wireless messaging infrastructure (510),

receiving (645) the first message,
characterised in that the method includes the steps of, in the wireless messaging infrastructure,
 transmitting (650) a second message (655) indicative of the second status; and

in a second transceiver (550),

receiving (665) the second message, and
 changing (675) a status of the second transceiver to the second status in response thereto.

4. The method according to claim 3 further **characterised by** the steps of:

in the first transceiver (550),

receiving (660) the second message; and
 decoding (660) the second message without further changing the status of the first

transceiver.

5. The method according to claim 3 or 4 wherein the first transceiver (530) and the second transceiver (550) have a multiplicity of status categories, each of the multiplicity of status categories having a state, and the first message is a signal indicative of state of status category which has changed in response to the input.

6. The method according to one of the claims 3-5 wherein said step of transmitting (635) the first message indicative of the second status in the first transceiver (530) further comprises the steps of:

delaying (630) transmission of the first message by a predetermined time after changing (620) the status of the first transceiver; changing (620) the status of the first transceiver to a subsequent status responsive to a subsequent input to the first transceiver; and transmitting (635) the subsequent status as the second status if the changing of the status to the subsequent status occurs within the predetermined time.

7. A system for synchronizing a status category of a plurality of communication devices (530, 550) communicating with an infrastructure (510), each of the plurality of communication devices having at least one status category, each of the at least one status category having a plurality of states, **characterised by:**

means in at least one communication device (530) of the plurality of communication devices for changing (620) a status category of the at least one communication device of the plurality of communication devices to produce a current state of the status category;

means in the at least one communication device of the plurality of communication devices to produce a synchronizing signal for signaling to the infrastructure the current state of the status category;

means in the infrastructure to produce a current state signal for signaling to an other communication device of the plurality of communication devices the current state of the status category of the at least one communication device of the plurality of communication devices in response to the synchronizing signal; and

means in the other communication device of the plurality of communication devices for changing the current state of the at least one status category of the other communication device of the plurality of communication devices to the current state of the at least one commu-

nication device of the plurality of communication devices responsive to the current state signal.

Patentansprüche

1. Verfahren zur Synchronisation von Nachrichteninformationen (208) unter einer Gruppe von Empfängern (130,150), enthaltend die Schritte:

- Übertragung (200) einer ersten Nachricht (205) mit einem ersten Status über eine drahtlose Nachrichteninfrastruktur;
- Veränderung (220) des ersten Status der ersten Nachricht in einem Empfänger (130) aus der Gruppe von Empfängern in einen zweiten Status auf Grund einer Eingabe in den einen Empfänger, und die Übertragung (235) einer zweiten Nachricht, die den zweiten Status anzeigt;
- in der drahtlosen Nachrichteninfrastruktur (110), Empfangen (245) der zweiten Nachricht,
- **dadurch gekennzeichnet, dass**
- in der drahtlosen Nachrichteninfrastruktur das Verfahren den Schritt einschließt:
- wegen des Empfangens der zweiten Nachricht, das Übertragen (250) einer dritten Nachricht (255), die den zweiten Status anzeigt; und
- in wenigsten einem anderen Empfänger (150) der Gruppe von Empfängern
- das Empfangen (265) der dritten Nachricht und als Reaktion auf das Empfangen der dritten Nachricht, die Veränderung des ersten Status der ersten Nachricht in den zweiten Status.

2. Verfahren nach Anspruch 1, bei dem der Schritt der Übertragung (200) der zweiten Nachricht, die den zweiten Status des einen Empfänger (130) anzeigt, weiter die Schritte umfaßt:

- Verzögerung der Übertragung der zweiten Nachricht für eine vorherbestimmte Zeitdauer nach der Veränderung (220) des ersten Status der ersten Nachricht;
- Veränderung (220) des ersten Status der ersten Nachricht in einen nachfolgenden Status in Abhängigkeit einer nachfolgenden Eingabe in den einen Empfänger; und
- Übertragung (235) des nachfolgenden Status als zweiten Status, wenn die Veränderung des ersten Status in den nachfolgenden Status innerhalb der vorherbestimmten Zeitdauer auftritt.

3. Verfahren zur Statussynchronisation einer Gruppe von Empfänger (530,550), enthaltend die Schritte:

- in einem ersten Empfänger (530)
 - Veränderung (620) des Status des ersten Empfängers von einem ersten Status in einen zweiten Status, als Ergebnis einer Eingabe von einem Benutzer, und 5
 - Übertragung (635) einer ersten Nachricht (640), die den zweiten Status anzeigt,
 - in einer drahtlosen Nachrichteninfrastruktur (510), 10
 - Empfangen (645) der ersten Nachricht,
 - **dadurch gekennzeichnet dass**
 - das Verfahren die Schritte umfaßt: 15
 - in einer drahtlosen Nachrichteninfrastruktur
 - Übertragen einer zweiten Nachricht (655), die den zweiten Status anzeigt; und 20
 - in einem zweiten Empfänger (550);
 - Empfangen (665) der zweiten Nachricht; und 25
 - Veränderung (675) eines Status des zweiten Empfängers in den zweiten Status als Reaktion darauf.
 - 4. Verfahren nach dem Anspruch 3, weiter **gekennzeichnet durch** die Schritte: 30
in einem ersten Empfänger (550),
 - Empfang der zweiten Nachricht; und
 - Dekodieren der zweiten Nachricht ohne weitere Veränderung des Status des ersten Empfängers. 35
 - 5. Verfahren nach einem der Ansprüche 3 oder 4, bei dem der erste Empfänger (530) und der zweite Empfänger (550) eine Vielzahl von Statuskategorien aufweisen, jede der vielen Statuskategorien weist einen Zustand auf, wobei die erste Nachricht ein Signal darstellt, welches den Zustand der Statuskategorie anzeigt, der sich wegen der Eingabe verändert hat. 40 45
 - 6. Verfahren nach einem der Ansprüche 3 bis 5, bei dem der Schritt, Übertragung (635) der ersten, den zweiten Status des ersten Empfängers (530) anzeigenden Nachricht weiter die Schritte umfaßt: 50
 - Verzögerung (630) der Übertragung der ersten Nachricht für eine vorherbestimmte Zeitdauer nach einer Veränderung (620) des Status des ersten Empfängers; 55
 - Veränderung (620) des Status des ersten Empfängers in einen nachfolgenden Status wegen
- einer nachfolgenden Eingabe in den ersten Empfänger; und
- Übertragen (635) des nachfolgenden Status als zweiten Status, wenn die Veränderung des Status in den nachfolgenden Status in der vorherbestimmten Zeitdauer auftritt.
7. System zur Synchronisation einer Statuskategorie einer Gruppe von Kommunikationsgeräten (530,550) die mit einer Infrastruktur (510) kommunizieren, wobei jedes aus der Gruppe von Kommunikationsgeräten wenigstens eine Statuskategorie aufweist und jede der wenigstens einen Statuskategorie mehrere Zustände aufweist, **gekennzeichnet, durch**
- Mittel in wenigstens einem Kommunikationsgerät (530) der Gruppe der Kommunikationsgeräte zur Veränderung (620) einer Statuskategorie des wenigstens einen Kommunikationsgerätes der Gruppe der Kommunikationsgeräte, um einen aktuellen Zustand der Statuskategorie zu erzeugen;
- Mittel in wenigstens einem Kommunikationsgerät aus der Gruppe von Kommunikationsgeräten zur Erzeugung eines Synchronisationssignals, um der Infrastruktur den aktuellen Zustand der Statuskategorie zu signalisieren;
- Mittel in der Infrastruktur zur Erzeugung ein aktuelles Zustandssignal, um einem anderen Kommunikationsgerät aus der Gruppe von Kommunikationsgeräten den aktuellen Zustand der Statuskategorie des wenigstens einen Kommunikationsgerätes aus der Gruppe von Kommunikationsgeräten als Reaktion auf das Synchronisationssignal zu signalisieren; und
- Mittel in dem anderen Kommunikationsgerät aus der Gruppe von Kommunikationsgeräten zur Veränderung des aktuellen Zustandes von der wenigstens einen Statuskategorie des anderen Kommunikationsgerätes aus der Gruppe der Kommunikationsgeräte in den aktuellen Zustand von dem wenigstens einen Kommunikationsgerät aus der Gruppe der Kommunikationsgeräte als Reaktion auf das aktuelle Zustandssignal.
- Revendications**
1. Procédé de synchronisation d'informations de message (208) entre plusieurs émetteurs-récepteurs (130, 150), comprenant les opérations suivantes :
- émettre (200), via une infrastructure de transmission de message sans fil, un premier message (205) ayant un premier état ;

- dans un premier émetteur-récepteur (130) de la pluralité d'émetteurs-récepteurs, changer (220) le premier état du premier message en un deuxième état en réponse à un signal d'entrée appliqué au premier émetteur-récepteur, et émettre (235) un deuxième message (240) indicatif du deuxième état ;
- dans l'infrastructure (110) de transmission de message sans fil, recevoir (245) le deuxième message ;
- le procédé étant **caractérisé en ce qu'**il comporte les opérations suivantes, dans l'infrastructure de transmission de message sans fil, qui consistent, en réponse à la réception du deuxième message, à émettre (250) un troisième message (255) indicatif du deuxième état ; et,
- dans au moins un autre émetteur-récepteur (150) de la pluralité d'émetteurs-récepteurs, recevoir (265) le troisième message et, en réponse à la réception du troisième message, changer (275) le premier état du premier message en le deuxième état.
2. Procédé selon la revendication 2, où ladite opération d'émission (200) du deuxième message indicatif du deuxième état existant dans le premier émetteur-récepteur (130) comprend en outre les opérations suivant :
- retarder (230) l'émission du deuxième message d'une durée prédéterminée après le changement (220) du premier état du premier message ;
- changer (220) le premier état du premier message en un état ultérieur en réponse à un signal d'entrée ultérieur appliqué au premier émetteur-récepteur ; et
- émettre (235) l'état ultérieur au titre du deuxième état si un changement du premier état en l'état ultérieur a eu lieu dans les limites de la durée prédéterminée.
3. Procédé de synchronisation de l'état d'une pluralité d'émetteurs-récepteurs (530, 550), comprenant les opérations suivantes :
- dans un premier émetteur-récepteur (530),
- changer (620) l'état du premier émetteur-récepteur en le faisant passer d'un premier état à un deuxième état à la suite d'un signal d'entrée venant de l'utilisateur, et émettre (635) un premier message (640) indicatif du deuxième état ;
- dans une infrastructure (510) de transmission de message sans fil,
- recevoir (645) le premier message, le procédé étant **caractérisé en ce qu'**il comporte les opérations suivantes, dans l'infrastructure de transmission de message sans fil : émettre (650) un deuxième message (655) indicatif du deuxième état ; et dans un deuxième émetteur-récepteur (650),
- recevoir (665) le deuxième message, et changer (675) l'état du deuxième émetteur-récepteur en le deuxième état, en réponse à celui-ci.
4. Procédé selon la revendication 3, **caractérisé en outre par** les opérations suivantes, effectuées dans le premier émetteur-récepteur (550):
- recevoir (660) le deuxième message ; et décoder (660) le deuxième message sans encore modifier l'état du premier émetteur-récepteur.
5. Procédé selon la revendication 3 ou 4, où le premier émetteur-récepteur (530) et le deuxième émetteur-récepteur (550) possèdent une multiplicité de catégories d'états, chaque catégorie de la multiplicité de catégories d'état ayant une situation, et le premier message est un signal indicatif de la situation de la catégorie d'états qui a été modifiée en réponse au signal d'entrée.
6. Procédé selon l'une quelconque des revendications 3 à 5, où ladite opération d'émission (635) du premier message indicatif du deuxième état existant dans le premier émetteur-récepteur (530) comprend en outre l'opération suivante :
- retarder (630) l'émission du premier message d'un temps prédéterminé après le changement (620) de l'état du premier émetteur-récepteur ;
- changer (620) l'état du premier émetteur-récepteur en un état ultérieur en réponse à un signal d'entrée ultérieur appliqué au premier émetteur-récepteur ; et
- émettre (635) l'état ultérieur au titre du deuxième état si le changement de l'état en l'état ultérieur s'est produit dans les limites du temps prédéterminé.
7. Système de synchronisation d'une catégorie d'états d'une pluralité de dispositifs de télécommunications (530, 550) qui communiquent avec une infrastructure (510), chaque dispositif de la pluralité de dispositifs de télécommunications ayant au moins une catégorie d'états, chaque catégorie parmi les catégories d'état ayant une pluralité de situations, le système étant **caractérisé par**:

un moyen placé dans au moins un dispositif de télécommunications (530) de la pluralité de dispositifs de télécommunications qui sert à changer (620) une catégorie d'états dudit au moins un dispositif de télécommunications de la pluralité de dispositif de télécommunications afin de produire une situation courante de la catégorie d'états ;

un moyen placé dans ledit au moins un dispositif de télécommunications de la pluralité de dispositifs de télécommunications qui sert à produire un signal de synchronisation destiné à signaler à l'infrastructure la situation courante de la catégorie d'états ;

un moyen placé dans l'infrastructure et servant à produire un signal de situation courante afin de signaler à un autre dispositif de télécommunications de la pluralité de dispositifs de télécommunications la situation courante de la catégorie d'états dudit au moins un dispositif de télécommunications de la pluralité de dispositifs de télécommunications en réponse au signal de synchronisation ; et

un moyen placé dans l'autre dispositif de télécommunications de la pluralité de dispositifs de télécommunications et servant à changer la situation courante de ladite au moins une catégorie d'état de l'autre dispositif de télécommunication de la pluralité de dispositifs de télécommunications en la situation courante dudit au moins un dispositif de télécommunications de la pluralité de dispositifs de télécommunications en réponse au signal de situation courante.

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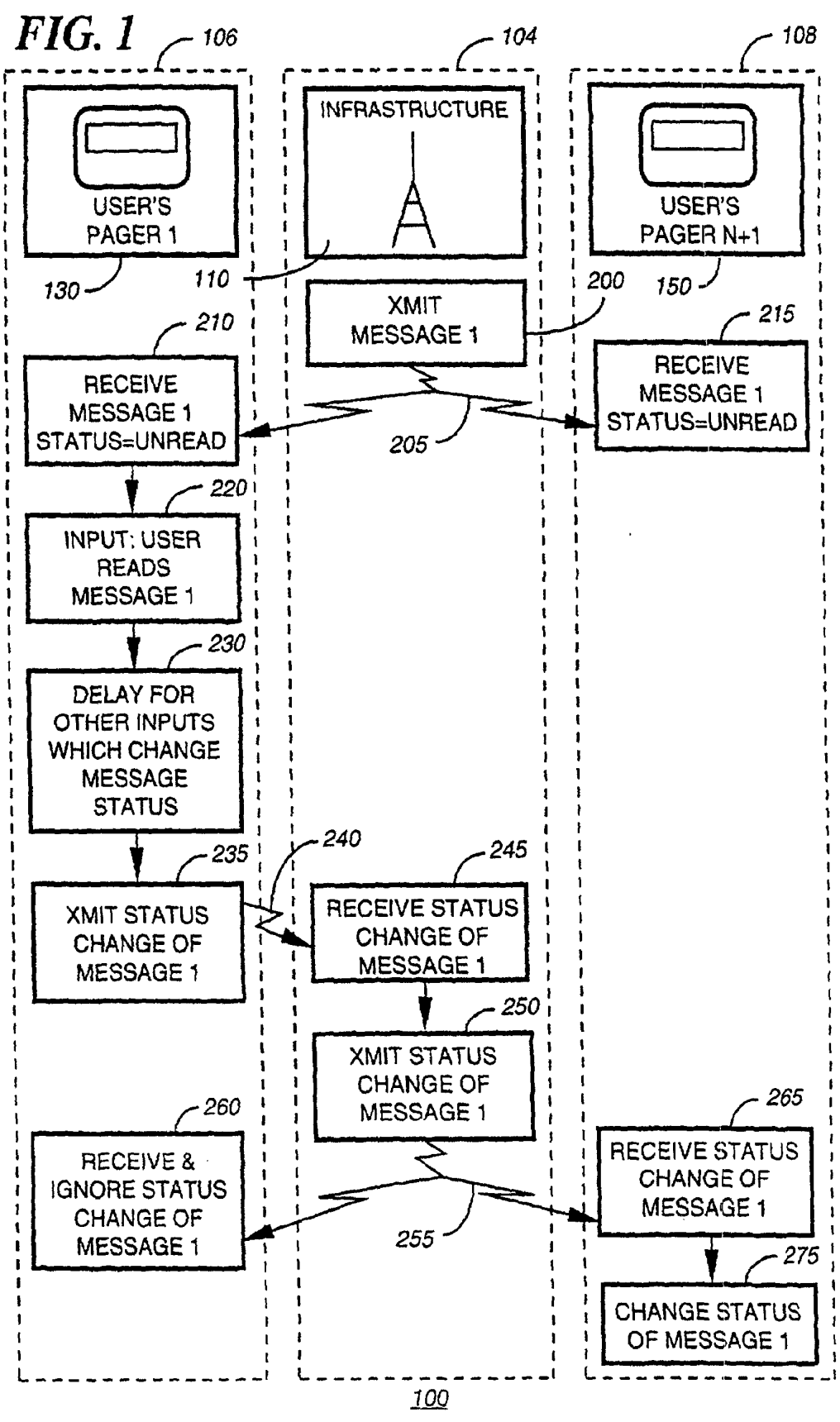
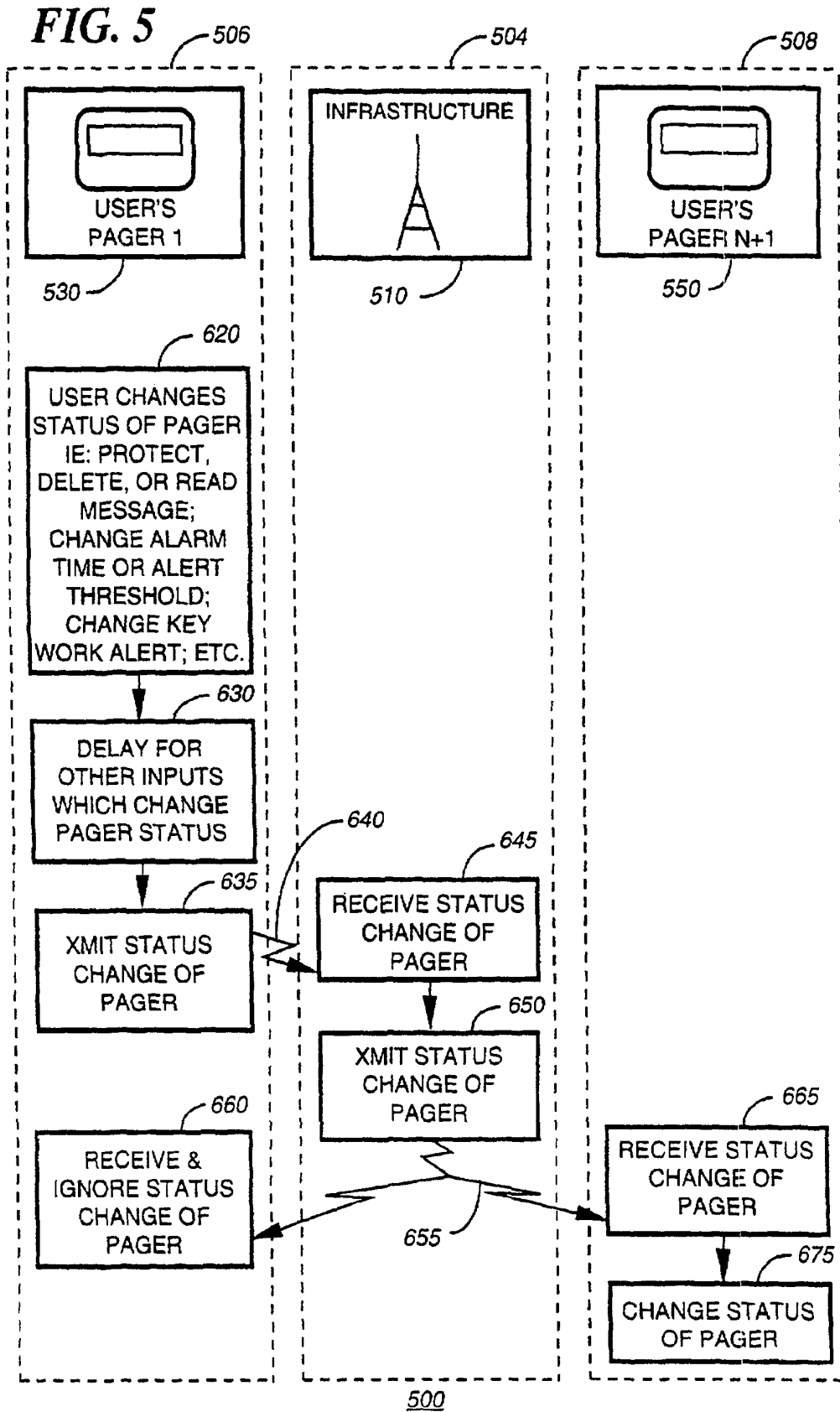
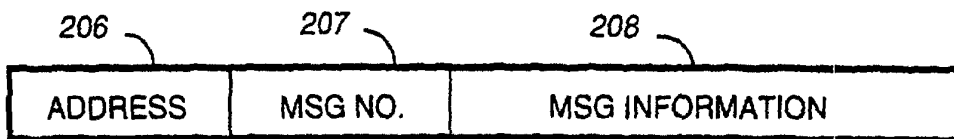


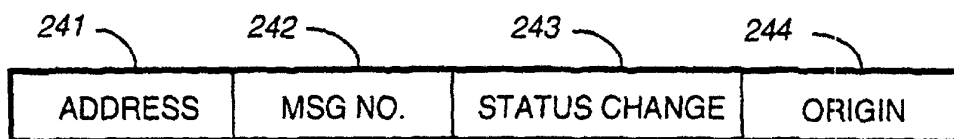
FIG. 5





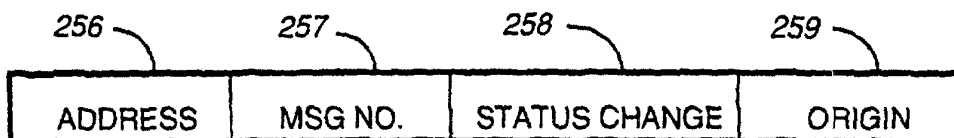
205

FIG. 2



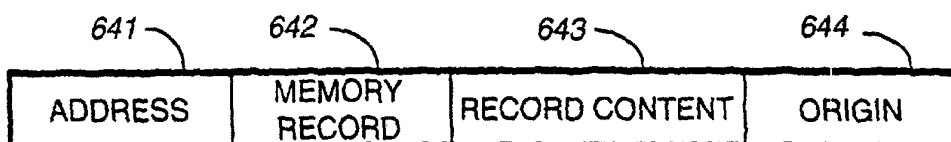
240

FIG. 3



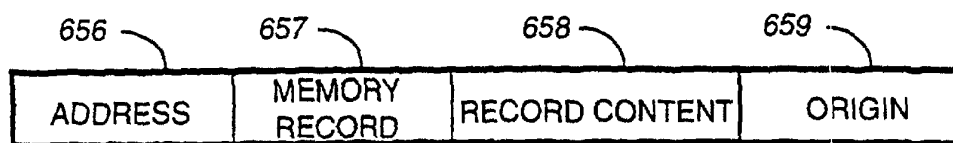
255

FIG. 4



640

FIG. 6



655

FIG. 7