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(54) **HOME SECURITY SURVEILLANCE SYSTEM**

HAUS-SICHERHEITSÜBERWACHUNGSSYSTEM

SYSTÈME DE SURVEILLANCE POUR LA SÉCURITÉ À DOMICILE

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Description

TECHNICAL FIELD

[0001] The present invention is directed to a home security surveillance system, and more particularly to such a system in which a service provider implements a home security service to individual customer's homes respectively equipped with in-house alarm network.

BACKGROUND ART

[0002] There has been proposed a hazard alarm system, for example, as disclosed in WO 2008/088079 that is designed to operate solely in a user's home for giving a fire alarm in a multiplicity of rooms or locations when any one of the locations is detected to see a fire occurrence. For this purpose, the prior alarm system utilizes a master detector and a plurality of slave detectors, which are disposed in different locations and are communicated with each other through an in-house network. Each of the detectors incorporates a detector for detection of a hazard or fire condition as well as an alarm unit which issues an alarm upon the detector generating a hazard signal indicative of the occurrence of the hazard condition. The master detector is specifically designed to receive the hazard signal from anyone of the slave detectors and to generate an interlocking hazard signal and transmit the same to all the other detectors for simultaneous alarm at every detectors or rooms. While on the other hand, the slave terminal is designed to transmit the hazard signal to the master detector and optionally to the other slave detectors, but not to relay the hazard signal to the others. Thus, only the master detector acts as a repeater to relay the hazard signal to all the other detectors in order to successfully issue the alarms from all of the detectors for enhancing system integrity against possible failure of issuing the alarm in any one of the rooms.

[0003] In recent years, there is a growing demand of expanding the above individual in-house alarm networks to an integrated network service or system with the use of a widely-available computer network, e.g. the Internet, in order to add an assistant service of dealing with the hazard condition by a third party other than the individual users. When implementing such integrated network service, it is required to employ a computer-based server on the side of a service provider, and a gateway in each of the users' homes as an interface between the in-house alarm network and the server so as to collect the hazard signal transmitted within the in-house alarm network. The server can be designed to communicate through the public computer network with the gateway so as to acknowledge hazard condition detected in the in-house alarm network for providing the assistance service upon receiving of the hazard condition detected in the in-house alarm network.

[0004] From US 2006/0132301 A1 is known a commu-

nications network for a security network. The communications network including at least one master base unit and at least two slave base units, or portable parts, is configured such that each of the master base units is capable of communicating with each of the slave base units, and each of the slave base units is capable of communicating with each of the master base units. The network is also configured such that each of the master base units and each of the network slave base units is capable of communicating with an outside telecommunications network.

[0005] In order to take advantage of the matured in-house network or subsystem utilizing the master detector as distinguished in its repeater function from the slave detectors, the system is required to identify the master detector and the slave detectors at an initialization of the system, i.e., at the time of installing the detectors in the individual users' home. When the master detector and the slave detector are provided as differently designed ones, no particular difficulty is seen at the initialization. However, when the detector of a universal design is provided to operate selectively as the master and slave for the sake of reducing complexity and manufacturing cost of the detectors, it is rather cumbersome for the user to set particular ones of the detectors respectively as the master and the slave, since most users are assumed to be unfamiliar with how to designate the master as distinguished from the slave. This is also true when the master or slave becomes defective and has to be replaced with a fresh detector. In fact, it becomes more cumbersome to reestablish the in-house network while correctly designating which one of the remaining terminals or the replacing terminal is set as the master or slave.

[0006] Accordingly, when implementing the above integrated network service in combination with the well-established in-house network, a special coordination is required to eliminate difficulty in setting the master and slave for easy installation and maintenance of the in-house network.

DISCLOSURE OF THE INVENTION

[0007] In view of the above issues, the present invention has been achieved to provide a home security surveillance system which is capable of easy installation and maintenance, while taking the advantage of using the master and the slave detectors in the in-house alarm network for assuring an integrated service of providing assistance by the third party to the individual customers each equipped with the in-house alarm network.

[0008] The home security surveillance system in accordance with the present invention includes a plurality of detection terminals arranged to detect a hazardous condition in a customer's home and generate a hazard signal, a computer-based server having a terminal enrollment table arranged to store an enrollment record for each of the detection terminals, and an input device adapted to communicate with the server through a public

computer network to enter and update the enrollment record in the server. Each detection terminal includes a radio transceiver for transmitting the hazard signal to the other detection terminal through a first communication network and a switch power. The server has a processor which is arranged to receive an aid-requesting signal originating from at least one of the detection terminals, and also includes an alert means which is configured to provide an alert report in response to receiving the aid-requesting signal. The enrollment record includes a terminal code predetermined to designate each of the detection terminals. Also included in the system is a gateway unit which is adapted to be installed in each of the customer's homes, and includes a communication means arranged to communicate with the server through the public computer network, and also to communicate with the detection terminals through a second communication network.

[0009] Each detection terminal includes an alarm unit which provides an alarm upon generating the hazard signal or receiving a linking hazard signal from one of the other detection terminals. Each detection terminal is also designed to function selectively as a master and a slave. The master is defined to provide the linking hazard signal when receiving the hazard signal from any one of the other detection terminal, while the slave is defined to transmit the hazard signal to the master through the first communication network. Further, each detection terminal is arranged to generate and transmit the air-requesting signal to the gateway unit through the second communication network upon generating the hazard signal.

[0010] The gateway unit is arranged to relay the aid-requesting signal to the server upon receiving the aid-requesting signal. The gateway unit includes an assigning means which is arranged to assign the master to one of the detection terminals energized upon the switch power being turned on to first establish the communication with the gateway unit, and the slave to the other detection terminal energized upon the switch power being turned on to later establish the communication with the gateway unit. The gateway unit further includes a terminal status table which stores a master/slave index indicative of whether each of the detection terminals is assigned as said master or slave, in addition to the enrollment record for each of said detection terminals. In this connection, the terminal enrollment table of the server is configured to store the master/slave index for each detection terminal.

[0011] The server is programmed to update the master/slave index in the terminal enrollment table in response to the assigning means of the gateway unit operating to assign the master or the slave to the corresponding one of the detection terminals. The gateway unit is programmed to update the terminal status table to reflect a change in the enrollment record of the terminal enrollment table. In this connection, each detection terminal is designed to have a terminal registration table for registration of the terminal code, the master/slave index,

and a node number which discriminates each one of the detection terminals from the other.

[0012] The detection terminal is configured to register in its terminal registration table, when assigned as the master, the terminal code, the master/slave index and the node number for all of the detection terminals. When, on the other hand, assigned as the slave, the detection terminal registers, in its terminal registration table, the terminal code, the master/slave index, and the node number of its own, in addition to the terminal code, the master/slave index, and the node number of the master.

[0013] Each detection terminal is provided with a configuration means and a set button which, upon being manipulated, activates the configuration means to send a configuration demand to the gateway unit and receive therefrom a configuration instruction by which the detection terminal is assigned as the master and the slave. The gateway unit is arranged to receive the configuration demand and read the master/slave index in the terminal status table so as to prepare the configuration instruction which assigns the master to the detection terminal transmitting the configuration demand only when the terminal status table has a record of the detection terminal transmitting the configuration demand, and has no record of any detection terminal already assigned as the master, and which assign the slave to the other detection terminal transmitting the configuration demand after the master is assigned to one of the detection terminals.

[0014] With this feature, the system can easily be self-adjusted in conformity with addition and/or replacement of the detection terminal for maintaining system integrity, only at an additional work of manipulating the set button on the side of the customer, and without requiring the customer to resort to difficult setting works. Also, when the master becomes defective and is replaced with a new detection terminal, the gateway unit can assign the newly added detection terminal as the replacement master.

[0015] Preferably, each detection terminal is arranged to send to the gateway unit a configuration demand accompanied with its own terminal code, either when it is energized to first establish communication with the gateway unit or when the set button is manipulated. In this connection, the gateway unit is programmed to check whether the terminal status tables shows a record of the detection terminal sending the configuration demand, and permits the assigning means to issue the configuration instruction of assigning the master or slave to the detection terminal when the terminal status table shows the record of such detection terminal sending the configuration demand. The assigning means is configured to send a registration instruction to the detection terminal when the terminal status table shows a record of such detection terminal to be assigned as the slave or when the terminal status tables shows a change of the master. Each detection terminal is programmed to make, in response to the registration instruction, a terminal registration which executes steps of:

- 1) requesting the master to receive a permission from the gateway unit that the terminal status table has a record of the terminal code corresponding to the requesting detection terminal;
- 2) requesting the master, upon reception of the permission, to allocate the node number to the requesting detection terminal and to send thus allocated node number to the gateway unit;
- 3) requesting the master to enter thus allocated node number in association with the terminal code and the master/slave index of the requesting detection terminal in the terminal registration table of the master; and
- 4) storing thus obtained node number in association with the terminal code and the master/slave index of the requesting detection terminal, in addition to the terminal code and a predetermined node number of the master, in the terminal registration table of the requesting detection terminal.

[0016] According to the above features, the detection terminal assigned as the slave, i.e., one that is first to communicate with the gateway unit after the gateway unit has assigned the master to preceding detection terminal, is successfully registered in the terminal registration table of the master as belonging to the master for establishing a relation between the master and the slave. All such registration steps can be done solely by collaboration between the gateway unit and the detection terminal, without requiring a cumbersome registration work on the side of the customer.

[0017] Further, each detection terminal may be arranged to transmit the configuration demand either when it is energized to communicate with the gateway unit or when the set button is manipulated, and receive the configuration instruction and the registration instruction from the gateway unit when the detection terminal is recorded in the terminal status table as a newly added detection terminal. Thus, the registration of the newly added detection terminal can be made also by using the set button.

[0018] Further, when the master becomes defective and is removed in the established system, the gateway unit operates to select one of the remaining detection terminals as a replacing master when such detection terminal comes first to communicate with the gateway unit after removal of the defective master. In order to enable such promotion of the existing slave to the new master, the gateway unit is configured to check whether a condition is satisfied in which the terminal status table shows no record of the detection terminal assigned as the master and shows a record of at least one remaining detection terminal, and to execute, when such condition is satisfied, a reconfiguration routine in response to receiving the configuration demand from any one of the remaining detection terminal of which record is read from the terminal status table. The reconfiguration routine comprises steps of:

- 1) deleting the master/slave index and the node number for all the remaining detection terminals from the terminal status table;
- 2) assigning the master to one of the remaining detection terminals which comes into communication with the gateway unit first after having its set button manipulated, and sending the configuration instruction as well as the registration instruction to the other ones of the remaining detection terminals in response to the detection terminal being activated by manipulation of the set button.

[0019] In this manner, the restructuring of the master and the slave as well as reregistration of the relation between the master and the slave can be easily completed under the control of the gateway unit, while only requiring the user to manipulate the set button.

[0020] Preferably, the gateway unit is programmed to update its terminal status table in match with the terminal status table in match with the terminal enrollment of said server, in response to the change in the enrollment record in said terminal enrollment table for immediate reflection of the change of the enrollment record.

[0021] Further, the detection terminal assigned as the slave may be programmed to transmit the hazard signal as the aid-requesting signal first to the gateway unit upon generating the hazard signal, and subsequently transmit the hazard signal to the master. Thus, the gateway can promptly transmit the aid-requesting signal to the server for immediate acknowledgement of the hazard condition on the side of the server.

[0022] In a preferred version of the system, the configuration means of the detection means is programmed to transmit the configuration demand at regular intervals to the gateway unit, thereby enabling the gateway unit to make the above reconfiguration routine without waiting the manipulation of the set button

[0023] Further, it is preferred that the first communication network and the second communication networks are arranged to have individual communication protocols different from each other. Thus, the system can be easily adapted to the integrated service network, while avoiding possible interference between the two networks.

[0024] These and still other advantageous features of the present invention will become more apparent from the following detailed description when taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0025]

FIG. 1 is a schematic view of a home security surveillance system in accordance with the present invention;

FIG. 2 is a schematic view illustrating terminal registration tables and a terminal status table respectively prepared in detection terminals and a gateway

unit constituting the above system, in addition to a terminal enrollment table of a server;
 FIG. 3 is a block diagram of the server;
 FIG. 4 is a block diagram of the detection terminal;
 FIG. 5 is a block diagram of the gateway unit;
 FIG. 6 is a timing chart illustrating how the detection terminals are assigned as a master and a slave;
 FIG. 7 is a timing chart illustrating how the system is reconfigured in case when one of the slave is removed from the system;
 FIG. 8 is a timing chart illustrating how the system is reconfigured in case when the master is removed from the system;
 FIG. 9 is a timing chart illustrating how the system is reconfigured in case one of the slaves is replaced with a new detection terminal;
 FIG. 10 is a timing chart illustrating how the system is reconfigured in case the master is replaced with a new detection terminal; and
 FIG. 11 is a timing chart illustrating an operation sequence upon detection of hazardous condition at one of the detection terminals.

BEST MODE FOR CARRYING OUT THE INVENTION

[0026] Now referring to FIG. 1, there is shown a home security surveillance system which employs a hazard detection subsystem in accordance with the present invention. The home security surveillance system is provided by a service provider and includes a computer-based server **30** installed on the side of a service provider for collecting hazard information such as fire occurrence from an in-house alarm network in each of customers' homes and providing an assistance, for instance, dispatching qualified personnel to the customers home and/or informing an urgent prompt to a customer out of ones' home. The in-house network is realized by the subsystem which is developed in each of the customers' homes and includes a plurality of detecting terminals **50** such as smoke detectors, and a gateway unit **10** which acts as an interface between the detecting terminals and the server **30**. The server **30** is equipped or linked with an alert device **38** which generates an alert report when receiving the hazard information in the form of an aid-requesting signal from any one of the detection terminals **50** through the gateway unit **10**. As will be discussed later in details, each of the detection terminals is configured to communicate with each other through a first communication network, and also communicate with the gateway unit **10** through a second communication network.

[0027] The system further includes an input device **100**, for instance, a personal computer or the like which belongs to each customer and is configured to communicate with the server **30** through a public computer network, e.g., the Internet for enrolling the detection terminals **50** in the server **30**. For this purpose, the server **30** is provided with a terminal enrollment table **37**, which is configured, as shown in FIG. 2, to store a record of ter-

minial code, for instance, manufacture's serial number entered by the customer by use of the input device **100**. No other entry is required on the side of the customer. The customer is only required to insert the record of the terminal code or delete such record in advance of developing the in-house alarm network of the subsystem.

[0028] As shown in FIG. 3, the server **30** includes, in addition to a memory constituting the terminal enrollment table **37**, a communication module **32** for communication with the input device **100** as well as the gateway unit **10** through the public network, and a processor constituting an enrolling module **34** and a hazard event module **36**. The enrolling module **34** is programmed to insert, delete, and update the enrollment record in the terminal enrollment table **37** in response to the customer's input at the input device **100**. The hazard event module **36** is programmed to activate an alert device **38** for providing the alert report in response to the aid-requesting signal transmitted by way of the gateway unit **10** and received at the communication module **32**. The alert device **38** may be a display, a speaker, or the like providing information to the personnel of the service provide.

[0029] The detection terminals **50** employed in the present invention are of the same configuration which enables each of the detection terminal to function selectively as a master and a slave. The detection terminal **50** is powered by an incorporated battery (not shown), and includes, as shown in FIG. 4, a power switch **52**, a smoke sensor **56**, an alarm unit **58**, a radio transceiver **68**, a processor, and a memory. The smoke sensor **56** is designed to detect a smoke density in an atmosphere and output a density signal indicative of the detected smoke density to a hazard event module **64** realized in the processor. When the smoke density exceeds a predetermined threshold, the hazard even module **64** generate a hazard signal indicative of possible fire and output the signal to the alarm unit **58**, which responds to give an alarm sound. The hazard signal is transmitted by means of the radio transceiver **68** to the other detection terminals **50** forming the in-house alarm network through the first communication network, and is also transmitted as the aid-requesting signal to the gateway unit **10** through the second communication network. To this end, the hazard event module **64** is configured to generate the hazard signal in compliance with a first communication protocol specific to the first communication network, and the aid-requesting signal in compliance with a second communication protocol, which is different from the first communication protocol, specific to the second communication network.

[0030] The master is defined to provide a linking hazard signal when receiving the hazard signal from any one of the other detection terminals, while the slave is defined to transmit the hazard signal to the master through the first communication network, and to give the alarm upon receiving the linking hazard signal from the master. The linking hazard signal is prepared in accordance with the first communication protocol and is transmitted from the

master to all of the slaves forming the in-house alarm network for providing the alarm at every detection terminals simultaneously. The master is also configured to generate and transmit the aid-requesting signal to the gateway unit **10** when receiving the hazard signal from any one of the slaves or when generating the hazard signal by its own. In this sense, the master acts as a repeater to transmit the aid-requesting signal to the gateway unit in parallel with the aid requesting signal transmitted from the slave directly to the gateway unit **10**. In addition, the slave is configured to transmit the hazard signal also to the other slave or slaves, when detecting the hazard configuration or fire occurrence. In order to make interrelated operations between the master and the slaves, the detection terminal has a terminal registration table **67** which is realized in the memory to store, as shown in FIG. 2, a record of a master/slave index indicative of the master or slave, and a node number discriminating each one of the detection terminals from the other within the in-house alarm network. Further, the record of the terminal registration table **67** includes the terminal code. When the detection terminal is assigned as the master, as will be discussed later, it is made to store the master/slave index and the node numbers for all of the detection terminals. When, on the other hand, the detection terminal is assigned as the slave, it is made to store the master/slave index and the node number of itself and the master.

[0031] The processor also realizes a configuration/registration module **62** which is programmed to interact with the gateway unit **10** to complete a terminal configuration of assigning the master and slave, and a terminal registration of determining the node number in association with the master/slave index.

[0032] As shown in FIG. 5, the gate unit **10** includes a radio transceiver **11** for communication with the server **30** as well as with the detection terminals **50** through the second communication network, which is distinguished from the first communication network of interconnecting the detection terminals **50** due to the use of a specific communication protocol different from that of the first communication network. The gateway unit **10** also includes a memory constituting a terminal status table **17** which has a configuration identical to the terminal enrollment table **37** and is updated to reflect a change in the enrollment record of the terminal enrollment table **37**. Further, the gateway unit **10** has a processor constituting a hazard event module **12**, an authentication module **14**, and an assigning module **16**. The hazard event module **12** is programmed to relay the aid-requesting signal to the server **30**, in response to receiving it from any one of the detection terminals **50**. The authentication module **14** is programmed to authenticate the detection module, i.e., check whether or not the detection terminal **50** making a configuration demand is recorded in the terminal status table **17**, and permits the entry of such detection terminal **50** into the in-house alarm network when it is so recorded in the terminal status table **17**. The assigning

module **16** is programmed to assign the master to one of the authenticated detection terminals **50** and the slave to the other authenticated detection terminals **50**. The result of such assignment is recorded in the terminal status table **17**, as well as in the terminal registration table **67** of each detection terminals.

[0033] Now referring to FIG. 6, the terminal configuration and the terminal registration are explained in details. After the customer enters the terminal code for each of the detection terminals **50** to be installed in one's home in the terminal enrollment table **37** of the server, the gateway unit **10** responds to record the terminal code in the terminal status table **17** when communicating first with the server. Thus, the gateway unit **10** becomes ready for making the terminal configuration. When one of the first detection terminals is energized with its power switch turned on, it transmits to the gateway unit **10** the configuration demand including the terminal code. When the gateway unit authenticates the detection terminal transmitting the configuration demand as being recorded in the terminal status table **17**, the gateway unit **10**, i.e., the assigning module **16** acknowledges that the detection terminal is the first one that establishes the communication with the gateway unit **10**, and returns a configuration request to the detection terminal, requesting the detection terminal to transmit a configuration response of a specific encryption key to the gateway unit **10**. When the gateway unit **10** verifies the configuration response as valid, it transmits a configuration instruction a configuration instruction to the detection terminal in order to assign the master thereto, and at the same time, updates the record of the terminal status table **17** with respect to the detection terminal by setting the master/slave index of "1" and the node number of "00", both indicating the master. The configuration request and the configuration response are provided only for exchanging the encryption key between the detection terminal and the gateway unit for an encrypted communication, and may be optional. That is, the gateway unit **10** may be configured to transmit the configuration instruction in direct response to the configuration demand from the detection terminal of which terminal code is authenticated.

[0034] Upon receiving the configuration instruction at the detection terminal **50**, the configuration/registration module **62** responds to write the master/slave index of "1" and the node number of "00" in association with the terminal code of its own in the terminal registration table **67**. Thus, the detection terminal **50** (hereinafter also referred to as "DT-master") becomes ready for registration of the other detection terminals (hereinafter also referred to as "DT-slave") which constitute the in-house alarm network with the DT-master.

[0035] Subsequently, when one of the other detection terminals **50** (DT-slave) is energized by manipulation of the power switch **52**, the detection terminal **50** (DT-slave) goes into a stage 1 sequence (i.e., a slave configuration sequence) of transmitting the configuration demand with its terminal code, and optionally receiving the configura-

tion request from the gateway unit **10**, and transmitting back the configuration response to the gateway unit **10**. When the terminal code is recorded in the terminal status table **17**, the gateway unit **10** assigns the slave to the detection terminal **50** (DT-slave) by transmitting to the DT-slave the configuration instruction by which the configuration/registration module **62** of the DT-slave responds to write the master/slave index of "0" as associated with its own terminal code in the terminal registration table **67**. When sending the configuration instruction to the DT-slave which establishes the communication with the gateway unit **10** later than the preceding one of the detection terminals, i.e., the DT-master, the gateway unit **10** includes a registration instruction in the configuration instruction. That is, the assigning module **16** generates the registration instruction to be added with the configuration instruction. When receiving such configuration instruction, the DT-slave goes into a stage 2 sequence (i.e., a slave registration sequence) starting from waking up the DT-master by sending a registration demand to the DT-master.

[0036] Upon receiving the registration demand, the DT-master responds to return a demand acknowledgement to the DT-slave, and a registration inquiry to the gateway unit **10**. Subsequently, the gateway unit **10** returns a slave registration permission which is prepared by the assigning module **16** to include the node number of "01" to be given to the DT-slave. Then, the DT-master responds to transmit a registration order to the DT-slave with the node number of "01" indicative of that the DT-terminal is the first slave recognized by the DT-master, in addition to the master/slave index, and the node number of about the DT-master so that the configuration/registration module **62** of the DT-slave updates the record of its own to have the node number of "01", and adds the record of the DT-master in the terminal registration table **67**, as shown in FIG. 2. After completion of updating the terminal registration table **67**, the DT-slave returns a registration response to the DT-master which responds to add the record of the DT-slave in its terminal registration table **67**. Upon receiving the registration response from the DT-slave, the DT-master sends a slave registration request to the gateway unit **10** so that the gateway unit updates the record of the DT-master and the newly added DT-slave in the terminal status table **17** with regard to the master/slave index and the node number in relation to the terminal code. After updating the terminal status table **17**, the gateway unit **10** issues a registration completion response to the DT-slave, completing the slave registration sequence, i.e., the stage 2 sequence.

[0037] If the registration completion response is not received within 2500 ms from the configuration demand, the above slave configuration sequence followed by the slave registration sequence is repeated. With the completion of the above registration for all of the other DT-terminals, the DT-master acknowledges each of the DT-slaves and the vice versa as constituting the in-house

alarm network such that the each DT-slave can transmit the hazard signal to the DT-master and the other DT-slave through the first communication network, i.e., the in-house alarm network, and the DT-master can transmit the aid-requesting signal to the gateway unit **10** through the second communication network upon receiving the hazard signal from any one of the DT-slaves, in addition to that each of the DT-slave can transmit the aid-requesting signal directly to the gateway unit **10** through the second communication network.

[0038] Referring to FIG. 7, there is shown a time chart illustrating how the system works when one of the DT-slaves is removed from the system. When the DT-slave, for instance, one having the node number of "01" becomes defective and is powered off, the customer utilizes the input device **100** to delete the record of the defective DT-slave from the terminal enrollment table **37** in the server **30**. The change of the record is reflected in the terminal status table **17** of the gateway unit **100** when it communicates with the server **30**. That is, the terminal status table **17** is updated to give a delete flag to the record of the defective DT-slave, indicating that such recorded is to be deleted. In this situation, the DT-master functions to make a status check sequence whether or not the registered DT-slaves are currently available in the system. The status check sequence is initiated by manipulation of a set button **54** on the side of the DT-master. Upon manipulation of the set button **54**, the configuration/registration module **62** responds to generate a status check request for all of the existing or registered DT-slaves, interrogating whether or not each of the DT-slaves registered in the terminal registration table **67** is recorded as a valid one in the terminal status table **17** of the gateway unit **10**. When returning a status request acknowledgement to the DT-master, the gateway unit **10** provides a slave remove instruction for deleting the defective DT-slave from the terminal registration table **67**, i.e., the record of the defective DT-slave which is marked with the delete flag in the terminals status table. In response to the slave remove instruction, the DT-master deletes such record from its terminal registration table **67**, and returns a slave remove confirmation to the gateway unit, such that the gateway unit updates its terminal status table **17** by actually deleting the record with the delete flag. When the other non-defective DT-slave, for example, having the node number of "02" has its set button **54** pressed, the DT-slave transmits a like status check request whether or not the DT-slave "02" is recorded in the terminal status table **17** of the gateway unit and receives therefrom the status request acknowledgement, which necessitates no change in the terminal registration table **67** of the DT-slave "02".

[0039] It is noted in this connection that the status check sequence is initiated by pressing the set button **54** for a short period, for example, less than 4 seconds. When, on the other hand, the set button **54** is pressed for a long period more than 4 seconds, the DT-master or DT-slave makes the above status check followed by a

manual test routine which generates a pseudo hazard signal for checking whether the in-house alarm system reacts to issue the alarm from the individual detection terminal. In this case, after sending the status check request and receiving the status request acknowledgement, the DT-master or the DT-slave issues a test request to the gateway unit which responds to return a test request acknowledgement. Upon receiving the test request acknowledgement, the DT-master or the DT-slave is allowed to enter a manual test mode of giving the pseudo hazard signal to generate the alarm within the in-house alarm network, while the gateway unit can acknowledge that the resulting alarm is false one and simply as a result of the test.

[0040] In addition, as will be discussed later with reference to FIG. 11, the set button, when long-pressed, issues a stop alarm signal provided that there is the hazardous condition detected in the in-house alarm network.

[0041] Further, it is also noted in this connection that the each of the DT-master and the DT-slaves is activated intermittently or comes into an intermittent operation mode of checking whether or not the hazardous condition is detected, and wakes-up to transmit the hazard signal as well as the aid-requesting signal immediately upon detection of the hazardous condition. In the figures, such intermittent operation mode of the terminal is denoted by the term "intermittent operation". Also, each of the DT-master and the DT-slave is configured to issue the status check request to the gateway unit at regular intervals for checking whether or not the second communication network operates successfully.

[0042] FIG. 8 illustrates a time chart how the system works when the DT-master is removed. As a result of that the DT-master becomes defective and is removed from the system, the customer is required to delete the record of the defective DT-master from the terminal enrollment table 37 in the server 30 such that the gateway unit 10 updates its terminal status table 17 to reflect the deletion. In this situation, when one of the DT-slaves, in this instance, DT-slave having the node number of "01" has its set button 54 pressed for the short period, this DT-slave makes the status check sequence by transmitting the status check request to the gateway unit 10. However, the gateway unit 10 fails to successfully return the status request acknowledgement to the DT-slave, because of that the gateway unit acknowledges no DT-master in its terminal status table 17. After repeating to transmit the status check request for a predetermined number within a predetermined period after the short-pressing of the set button 54, the DT-slave is allowed to make the configuration sequence to the gateway unit 10. Upon receiving the configuration demand from the DT-slave, the gateway unit 10 makes a reconfiguration routine for reestablishing the in-house alarm network. The reconfiguration routine continues by the gateway unit 10 returning the configuration instruction by which the receiving DT-slave is assigned as a new master and rewrites its ter-

minal registration table 67 to have the master/slave index of "1". That is, upon receiving the configuration demand, as explained with reference to FIG. 6, from the detection terminal establishing the communication with the gateway unit, the gateway unit refers to its terminal status table and permits the assigning module 16 to assign the master to the detection terminal transmitting the configuration demand, only when the terminal status table shows a record of the detection terminal transmitting the configuration demand, and shows no record of any detection terminal already assigned as the master.

[0043] At this time, the gateway unit 10 updates the terminal status table 17 to rewrite the master/slave index of the new DT-master. Thereafter, the DT-master transmits the status check request to the gateway unit 10 which returns the status request acknowledgement to the DT-master. Whereby, the DT-master responds to clear the records of the remaining DT-slaves with regard to the node number, and the gateway unit 10 clears the records of the remaining DT-slaves with regard to the node number. Then, the gateway unit 10 becomes ready for completing the reconfiguration routine in combination with the DT-master. That is, upon receiving the configuration demand from each of the remaining DT-slaves, in this instance, DT-slave having the node number of "02", the gateway unit 10 generates the configuration instruction designating a new node number of "01" and the master/slave index of "0", and transmits the same to the DT-slave, which responds to update its own terminal registration table 67 correspondingly, thereby completing the stage 1 sequence (slave configuration sequence). At this time, the gateway unit 10 has its terminal status table 17 updated to reflect the change made to the DT-slave. The configuration instruction generated in the gateway unit 10 includes the registration instruction by which the DT-slave comes into the stage 2 sequence (i.e., the slave registration sequence), which starts from waking up the new DT-master by sensing the registration demand and complete by receiving the registration completion response from the gateway unit 10, as explained in details with reference to FIG. 6. Similarly, any of the remaining DT-slaves completes the above reconfiguration routine simply by pressing the set button 54 for the short time period. Upon completion of the reconfiguration of the all the existing DT-slaves, the new DT-master has its terminal registration table 67 updated to acknowledge the DT-slaves by their node numbers for communication within the in-house alarm network, in addition to that the DT-master as well as the DT-slaves can communicate with the gateway unit 10 with the use of individual node numbers.

[0044] Referring to FIG. 9, there is shown another time chart illustrating how the system works when replacing the DT-slave with a new one. As a result of that one registered DT-slave (one having the node number "01", in this instance) becomes defective and has to be replaced with the new detection terminal, the customer uses the input device 100 to remove the record of the defective

DT-slave from the terminal enrollment table 37 in the server 30 and insert a record of the newly added detection terminal in the terminal enrollment table 37. The change of the record is reflected in the terminal status table 17 of the gateway unit 100 when it communicates with the server 30. In this situation, upon being energized to communicate with the gateway unit 10, the new DT-slave interacts with the gateway unit 10 to complete the stage 1 sequence and the stage 2 sequence as explained herein above so as to be given the master/slave index of "0" and a new node number, whereby the new DT-slave is recognized by the gateway unit 10 and also by the DT-master for successful communication therebetween. Subsequently, in response to the short-pressing of the set button 54, the DT-master makes the status check sequence whether or not the DT-slaves recorded in its terminal registration table are currently available in the system. That is, the DT-master generates and transmits the status check request to the gateway unit 10, interrogating whether or not each of the DT-slaves recorded in the terminal registration table 67 is also recorded as valid one in the terminal status table 17 of the gateway unit 10. When returning a status request acknowledgement to the DT-master, the gateway unit 10 provides the slave remove instruction for deleting from the terminal registration table 67 the record of the terminal which is marked with the delete flag in the terminal status table 17. In response to the slave remove instruction, the DT-master deletes such record from its terminal registration table 67, and returns the slave remove confirmation to the gateway unit for completely deleting such record also from the terminal status table. Thereafter, when the DT-slave has its set button short-pressed, it transmits the status check request to the gateway unit 10 which returns the status request acknowledgement indicative of that no change is necessary for the terminal registration table 67 of the requesting DT-slave.

[0045] When the DT-master becomes defective and is replaced with a new one, the system operates as shown in FIG. 10. In this situation, the user updates the terminal enrollment table 37 of the server 30 by deleting the record of the defective DT-master and inserting the terminal code of a new detection terminal. The resulting change is reflected in the terminal status table 17 of the gateway unit 10. In response to the new detection terminal being energized to establish the communication with the gateway unit 10 by sending the configuration demand, the gateway unit 10 checks whether or not there is the record of the detection terminal assigned as the master in the terminal status table 17, and complete the stage 1 sequence by sending the configuration instruction, which assigns the master to the new detection terminal when the terminal status table shows no record of the detection terminal assigned as the master. Thus, the newly added detection terminal is acknowledged as the new DT-master. Thereafter, the new DT master transmits the status check request to the gateway unit 10 and receives therefrom the status request acknowledgement for confirma-

tion of that the DT-master is recorded in the terminal status table. At this time, the DT-master does not acknowledge the associated DT-slaves, since no record of the DT-slaves are entered in its terminal registration table 67. Also, the gateway unit 10 clears the node number of each DT-slave from its terminal status table, such that it fails to return the status acknowledgement to each DT-slave, even when each DT-slave has its set button short-pressed in an attempt to interact with the gateway unit.

[0046] Subsequently, upon short-pressing of the set button, the DT-master sends the status check request, requesting the gateway unit 10 to accept the configuration demand followed by the status check request from each DT-slave. After that, the DT-slave is allowed to make the configuration sequence to the gateway unit and receives the configuration instruction to complete the stage 1 sequence and the stage 2 sequence in a manner as described in the above, whereby the DT-slave is redefined as the slave with the node number given from the gateway unit, and is recorded in the terminal registration table of the DT-master. In this manner, all of the existing DT-slaves are redefined and acknowledged by the DT-master and the gateway unit.

[0047] FIG. 11 illustrates how the system works upon detection of the hazardous condition at one of the DT-slaves. In this instance, DT-slave having the node number of "01" (herein after referred to as detecting DT-slave) detects the hazardous condition and is caused to wake-up to issue the alarm and to transmit the aid-requesting signal to the gateway unit 10. Then, the gateway unit responds to relay the aid-requesting signal to the server 30 to notify the hazardous condition, and return an aid-request acknowledgement to the detecting DT-slave. Immediately subsequently, the detecting DT-slave transmits the hazard signal, waking up the DT-master as well as the other DT-slave (hereinafter referred to as non-detecting DT-slave). In response to the hazard signal, the non-detecting DT-slave issues the alarm, while the DT-master generates and transmits the linking hazard signal to the detecting and non-detecting DT-slaves such that each DT-slave issues the alarm. If the non-detecting DT-slave should have failed to wake-up due to some temporary communication error, it is caused to wake-up by the interconnecting hazard signal and issue the alarm. The detecting DT-slave and the non-detective DT-slave, when waking-up, return a linking alarm response back to the DT-master, which in turn comes into an interlocked mode of transmitting the aid-requesting signal repeatedly to the gateway unit, and at the same time transmitting the linking hazard signal repeatedly to the detecting and non-detective DT-slaves.

[0048] Upon the set button being pressed in this situation where the linking hazard signal is repeatedly transmitted, the DT-master transmits an alarm stop order to the detecting and non-detecting DT-slaves, and at the same time transmits an alarm status signal to the gateway unit, indicating that the DT-master is requesting the DT-slaves to stop the alarm. The alarm stop order and

the alarm status signal are transmitted repeatedly within a predetermined time period of 90 seconds, for example. After the elapse of the time period, the DT-master transmits an alarm stop confirmation, requesting the detective and non-detective DT-slaves to return an alarm stop response indicative of that the alarm stop order is accepted at the DT-slave. However, while the detecting DT-slave is still detecting the hazardous condition, the detecting DT-slave returns the alarm stop response indicative of the hazardous condition such that the DT-master responds to continue transmitting the linking hazard signal until the hazardous condition is cleared, and continues transmitting to the gateway unit the aid-request signal including information that the hazardous condition is still being detected at the detecting DT-slave after the DT-master transmits the alarm stop order.

[0049] When the hazardous condition is cleared, the detecting DT-slave transmits a stop alarm demand to the DT-master, while stopping its own alarm. Then, the DT-master responds to transmit a stop alarm confirmation order to all the DT-slaves, requesting them to return a stop alarm response including information whether or not the DT-slave is ready for stopping the alarm. Upon acknowledgement of the stop alarm response, the DT-master transmits a stop alarm order to the DT-slaves for stopping the alarm at the individual DT-slaves. When the alarm is stopped, each DT-slave returns the stop alarm response indicative of the alarm status to the DT-master, and comes into the intermittent reception mode. Likewise, the DT-master comes into the intermittent reception mode upon receiving the stop alarm response from the DT-slaves. Further, after receiving the stop alarm demand and until receiving the stop alarm response, the DT-master functions to transmit the alarm status signal to the gateway unit with information that the DT-master receives the stop alarm demand from the detecting DT-slave.

[0050] It is noted that the detection terminal is designed to issue the alarm as a sound-voice "whiz whiz warning smoke alarm" when the hazardous condition is detected by its own, and to issue the alarm as a sound-voice "whiz whiz warning smoke in another room" when the hazardous condition is detected by the other detection terminal.

[0051] While the detection terminal is in the intermittent operation mode, it transmits the status check request at regular intervals of 33 hours, for instance, to the gateway unit with information about a battery condition or some parameters indicative whether or not the detection terminal is in good order.

Claims

1. A home security surveillance system comprising:

- a plurality of detection terminals (50) arranged to detect a hazardous condition in a customer's home and generate a hazard signal, each of said

detection terminals including a radio transceiver (68) for transmitting said hazard signal to the other detection terminal through a first communication network and a power switch (52),

- a computer-based server (30) having a terminal enrollment table (37) arranged to store an enrolment record for each of said plurality of detection terminals, said server having a processor which is arranged to receive an aid-requesting signal originating from at least one of said detection terminals, said server having an alert means (38) being configured to provide an alert report in response to receiving said aid-requesting signal, said enrollment record including a terminal code predetermined to designate each of said detection terminals;

- an input device (100) adapted to communicate with said server through a public computer network in order to enter and update said enrollment record in said server; and

- a gateway unit (10) being adapted to be installed in each of said customers' homes, and including a communication means (11) which is arranged to communicate with said server through said public computer network, and also to communicate with said detection terminals through a second communication network, wherein each of said detection terminals includes an alarm unit (58) which provides an alarm upon such detection terminal generating said hazard signal or receiving a linking hazard signal from one of the other detection terminals, each of said detection terminals being arranged to function selectively as a master and a slave, said master being defined to provide said linking hazard signal when receiving said hazard signal from any one of the other detection terminal, and said slave being defined to transmit said hazard signal to said master through said first communication network,

each of said detection terminals being arranged to generate and transmit said aid-requesting signal to said gateway unit through said second communication network upon generating said hazard signal;

said gateway unit being arranged to relay said aid-requesting signal to said server upon receiving said aid-requesting signal,

said gateway unit including an assigning means (16) arranged to assign as said master one of said detection terminals energized by manipulation of the power switch to first establish communication with said gateway unit, and assign as said slave the other detection terminal energized by manipulation of the power switch to later establish communication with said gateway unit,

said gateway unit including a terminal status ta-

ble (17) storing a master/slave index Indicative of whether each of said detection terminals is assigned as said master or slave, in addition to said enrollment record for each of said detection terminals,

5 said terminal enrollment table of said server being arranged to store said master/slave index for each of said detection terminal,

10 said server being programmed to update said master/slave index in said terminal enrollment table in response to said assigning means of said gateway unit operating to assign said master or said slave to the corresponding one of said detection terminals,

15 said gateway unit being programmed to update said terminal status table to reflect a change in the enrollment record of said terminal enrollment table,

20 each of said detection terminals including a terminal registration table (67) configured to register said terminal code, said master/slave index, and a node number which discriminates each one of said detection terminals from the other, said detection terminal being configured to register in said terminal registration table, when assigned as said master, said terminal code, said master/slave index and said node number for all of said detection terminals,

25 said detection terminal being configured to register in its said terminal registration table, when assigned as said slave, said terminal code, said master/slave index, and said node number of its own, in addition to said terminal code, said master/slave index, and said node number of said master,

30 each of said detection terminals being provided with a configuration means and a set button which, upon being manipulated, activates said configuration means to transmit a configuration demand to said gateway unit and receive therefrom a configuration instruction by which said detection terminal is assigned as said master or said slave,

35 said gateway unit being arranged to receive said configuration demand from said detection terminal and read said master/slave index in said terminal status table so as to prepare said configuration instruction which assigns as said master the detection terminal transmitting said configuration demand only when said terminal status

40 table has a record of the detection terminal transmitting said configuration demand, and also has no record of any detection terminal already assigned as said master, and which assigns as said slave the other detection terminal

45 transmitting the configuration demand after the master is assigned to one of the detection terminals.

2. A home security surveillance system as set forth in claim 1, wherein each of said detection terminal is arranged to send to said gateway unit a configuration demand accompanied with its own terminal code, either when it is energized to establish communication first with said gateway unit or when said set button is manipulated, said gateway unit being programmed to check whether said terminal status table shows a record of the detection terminal sending said configuration demand, and permit said assigning means to issue said configuration instruction of assigning said master or slave to said detection terminal when said terminal status table shows the record of such detection terminal sending said configuration demand, said assigning means being arranged to send a registration instruction to said detection terminal when said terminal status table shows a record of such detection terminal to be assigned as said slave or when said terminal status tables shows a change of said master, each of said detection terminal being programmed to make, in respond to said registration instruction, a terminal registration which executes steps of:

- requesting said master to receive a permission from said gateway unit that said terminal status table has a record of the terminal code corresponding to said requesting detection terminal;
- requesting said master, upon reception of said permission, to allocate said node number to said requesting detection terminal and to send thus allocated node number to said gateway unit;
- requesting said master to enter thus allocated node number in associate with the terminal code and said master/slave index of the requesting detection terminal in said terminal registration table of said master; and
- storing thus obtained node number in association with said terminal code and master/slave index of the requesting detection terminal, in addition to the terminal code and a predetermined node number of said master, in said terminal registration table of the requesting detection terminal.

3. A home security surveillance system as set forth in claim 2, wherein each of said detection terminal is arranged to transmit said configuration demand either when it is energized to communicate with the gateway unit or when said set button is manipulated, and receive said configuration instruction and said registration instruction from said gateway unit when said detection terminal is recorded in said terminal status table as a newly added detection terminal.
4. A home security surveillance system as set forth in

claim 2, wherein

said gateway unit is configured to check whether a condition is satisfied in which said terminal status table shows no record of the detection terminal assigned as said master and shows some record of at least one remaining detection terminal, and to execute, when such condition is satisfied, execute a reconfiguration routine in response to receiving said configuration demand from any one of the remaining detection terminal of which record is read from said terminal status table,

said reconfiguration routine comprising the steps of:

- a) deleting said master/slave index and said node number for all the remaining detection terminals from said terminal status table;
- b) assigning said master to one of said remaining detection terminals which comes into communication with said gateway unit first after having its set button manipulated, and sending said configuration instruction and said registration instruction to the other of said remaining detection terminals in response to said detection terminal being activated by manipulation of said set button.

5. A home security surveillance system as set forth in claim 1, wherein

said gateway unit is programmed to update its terminal status table in match with said terminal enrollment table of said server, in response to the change in said enrollment record in said terminal enrollment table.

6. A home security surveillance system as set forth in claim 1, wherein

said slave is programmed to transmit said hazard signal as said aid-requesting signal first to said gateway unit upon generating said hazard signal, and then transmit said hazard signal to said master, said gateway unit is programmed to transmit said aid-requesting signal to said sever upon receiving said aid-requesting signal from anyone of said master and slave.

7. A home security surveillance system as set forth in claim 1, wherein

said configuration means of each said detection terminal is programmed to transmit said configuration demand at regular time intervals to said gateway unit.

8. A home security surveillance system as set forth in claim 1, wherein

said first communication network and said second communication networks are arranged to have individual communication protocols different from each other.

Patentansprüche

1. Heimüberwachungssystem mit:

- mehreren Detektionsgeräten (50), die ausgebildet sind, um eine gefährliche Bedingung in einem Haus eines Nutzers zu detektieren und ein Gefahrensignal zu erzeugen, wobei jedes der Detektionsgeräte einen Funksender/Empfangsgerät (68) zum Übertragen des Gefahrensignals an die anderen Detektionsgeräte über ein erstes Kommunikationsnetzwerk und einen Netzschalter (52) umfasst,
- einem Computer-basierten Server (30) mit einer Geräteanmeldetabelle (37), die ausgebildet ist, um eine Anmeldeaufzeichnung für jedes der mehreren Detektionsgeräte zu speichern, wobei der Server einen Prozessor aufweist, der ausgebildet ist, um ein Hilfe-Anfragesignal, welches von zumindest einem der Detektionsgeräte stammt, zu empfangen, wobei der Server Wamittel (38) aufweist, die ausgebildet sind, um einen Warnbericht in Antwort auf das Erhalten des Hilfeanfragesignals bereitzustellen, wobei die Anmeldeaufzeichnung einen Geräte-Code umfasst, der vorbestimmt jedes der Detektionsgeräte bezeichnet;
- einem Eingabegerät (100), welches ausgebildet ist, um mit dem Server über ein öffentliches Computernetzwerk zu kommunizieren, um die Anmeldeaufzeichnungen in den Server einzugeben und zu erneuern; und
- einer Gateway-Einheit (10), die ausgebildet ist, um in jedem der Häuser der Nutzer installiert zu werden, und Kommunikationsmittel (11) umfasst, die ausgebildet sind, um mit dem Server über das öffentliche Computernetzwerk zu kommunizieren und ebenfalls mit den Detektionsgeräten über ein zweites Kommunikationsnetzwerk zu kommunizieren, wobei jedes der Detektionsgeräte eine Alarmeinheit (58) umfasst, die ein Alarm auslöst, wenn solch ein Detektionsgerät das Gefahrensignal erzeugt oder ein verbundenes Gefahrensignal von einem der anderen Detektionsgeräte empfängt, wobei jedes der Detektionsgeräte ausgebildet ist, um selektiv als ein Master oder ein Folgegerät zu fungieren, wobei der Master definiert ist, um das verbundene Gefahrensignal bereitzustellen, wenn das Gefahrensignal von einem der anderen Detektionsgeräte empfangen wird, und das Folgegerät definiert ist, um das Gefahrensignal an den Master über das erste Kommunikationsnetzwerk zu übertragen, wobei jedes der Detektionsgeräte ausgebildet ist, um das Hilfe-Anfragesignal zu erzeugen und an die Gateway-Einheit über das zweite Kom-

munikationsnetzwerk auf das Erzeugen des Gefahrensignals zu übertragen;

wobei die Gateway-Einheit ausgebildet ist, um das Hilfe-Anfragesignal an den Server auf das Erhalten des Hilfeanfragesignals weiterzuleiten, wobei die Gateway-Einheit Zuweisungsmittel (16) aufweist, die ausgebildet sind, um als Master einen von den Detektionsgeräten zu bestimmen, das durch ein Betätigen des Netzschalters mit Energie versorgt wird, um zuerst eine Kommunikationsverbindung mit der Gateway-Einheit herzustellen und als Folgegerät die anderen Detektionsgeräte zu bestimmen, die durch ein Betätigen des Netzschalters mit Energie versorgt werden, um später eine Kommunikationsverbindung mit der Gateway-Einheit herzustellen,

wobei die Gateway-Einheit eine Gerätestatus-Tabelle (17) umfasst, die einen Master-/Folgegerätindex speichert, der darauf hinweist, ob jedes der Detektionsgeräte als der Master oder das Folgegerät bestimmt ist, und zwar zusätzlich zu der Anmeldeaufzeichnung für jedes der Detektionsgeräte,

wobei die Geräteanmeldetabelle des Servers ausgebildet ist, um den Master-/Folgegerätindex für jedes der Detektionsgeräte zu speichern,

wobei der Server programmiert ist, um den Master-/Folgegerätindex in der Geräteanmeldetabelle in Antwort darauf zu speichern, dass die Zuweisungsmittel der Gateway-Einheit bewirken, dass der Master oder das Folgegerät als das entsprechende eine Detektionsgerät bestimmt wird,

wobei die Gateway-Einheit programmiert ist zum Erneuern der Gerätestatus-Tabelle, um eine Änderung in der Anmeldeaufzeichnung der Geräteanmeldetabelle wiederzugeben,

wobei jedes der Detektionsgeräte eine Geräte-Registrierungstabelle (67) umfasst, die ausgebildet ist zum Registrieren des Geräte-Codes, des Master-/Folgegerätindex und einer Knotenzahl, die jedes der Detektionsgeräte voneinander unterscheidet,

wobei das Detektionsgerät ausgebildet ist zum Registrieren in der Geräte-Registrierungstabelle, wenn es als Master bestimmt wurde, eines Geräte-Codes, des Master-/Folgegerätindex und der Knotenzahl für alle der Detektionsgeräte,

wobei das Detektionsgerät ausgebildet ist zum Registrieren in seiner Geräteregistrierungstabelle, wenn es als Folgegerät bestimmt wurde, seines Geräte-Codes, seines Master-/Folgegerätindex und seiner Knotenzahl, zusätzlich zu dem Geräte-Code, dem Master-/Folgegerätindex und der Knotenzahl des Masters,

wobei jedes der Detektionsgeräte bereitgestellt ist mit Konfigurationsmitteln und einem Einstellknopf, der auf seine Betätigung die Konfigurationsmittel aktiviert, um eine Konfigurationsnachfrage an die Gateway-Einheit zu übertragen und um von dort Konfigurationsinstruktionen zu erhalten, durch welche das Detektionsgerät als Master oder als Folgegerät bestimmt ist, wobei die Gateway-Einheit ausgebildet ist zum Erhalten der Konfigurationsnachfrage von dem Detektionsgerät und um den Master-/Folgegerätindex in der Gerätestatus-Tabelle zu lesen, um so die Konfigurationsinstruktion vorzubereiten, die das Detektionsgerät, welches die Konfigurationsanfrage übertragen hat, als Master nur dann zu bestimmen, wenn die Gerätestatus-Tabelle einen Eintrag des Detektionsgerätes, welches die Konfigurationsnachfrage gesandt hat, aufweist, und ebenfalls keinen Eintrag von irgendeinem anderen Detektionsgerät, welches bereits als Master bestimmt wurde, aufweist, und welches als Folgegerät die anderen Detektionsgeräte bestimmt, die die Konfigurationsnachfrage übertragen, nachdem als Master eines der Detektionsgeräte bestimmt wurde.

2. Heimüberwachungssystem nach Anspruch 1, wobei jedes der Detektionsgeräte ausgebildet ist zum Senden an die Gateway-Einheit einer Konfigurationsnachfrage zusammen mit seinem eigenen Geräte-Code, entweder wenn es angeschaltet wird, um zuerst eine Kommunikationsverbindung mit der Gateway-Einheit herzustellen, oder wenn der Schaltknopf betätigt wird, wobei die Gateway-Einheit programmiert ist zum Prüfen, ob die Gerätestatus-Tabelle einen Eintrag für das Detektionsgerät, welches die Konfigurationsnachfrage gesandt hat, aufweist, und zum Erlauben, dass die Zuweisungsmittel die Konfigurationsinstruktion zum Bestimmen als Masters oder als Folgegerätes an das Detektionsgerät herausgibt, wenn die Gerätestatus-Tabelle den Eintrag eines solchen Detektionsgerätes, welches die Konfigurationsnachfrage gesandt hat, zeigt, wobei die Zuweisungsmittel ausgebildet sind zum Senden einer Registrierungsinstruktion an das Detektionsgerät, wenn die Gerätestatus-Tabelle einen Eintrag eines solchen Detektionsgerätes, welches als das Folgegerät bestimmt ist, oder wenn die Gerätestatus-Tabelle eine Wechsel des Masters anzeigt, wobei jedes der Detektionsgeräte programmiert ist, in Antwort auf die Registrierungsinstruktion, eine Geräteregistrierung auszuführen, die folgende Schritte ausführt:

- Anfragen beim Master zum Erhalt einer Genehmigung von der Gateway-Einheit, dass die Gerätestatus-Tabelle einen Eintrag eines Geräte-

Codes aufweist, der dem des anfragenden Detektionsgerätes entspricht;

- Anfragen beim Master, auf dem Erhalt der Erlaubnis, zum Reservieren der Knotenzahl für das anfragende Detektionsgerät und zum Senden der so reservierten Knotenzahl an die Gateway-Einheit;

- Anfragen beim Master zum Eintragen der so reservierten Knotenzahl als Verknüpfung mit dem Geräte-Code und des Master-/Folgegerätes des anfragenden Detektionsgerätes in die Geräteregistrierungstabelle des Masters; und

- Speichern der so erhaltenen Knotenzahl als Verknüpfung mit dem Geräte-Code und des Master-/Folgegerätes des anfragenden Detektionsgerätes, zusätzlich zu dem Geräte-Code und einer vorbestimmten Knotenzahl des Masters, in der Geräteregistrierungstabelle des anfragenden Detektionsgerätes.

3. Heimüberwachungssystem nach Anspruch 2, wobei jedes der Detektionsgeräte ausgebildet ist zum Übertragen der Konfigurationsanfrage, entweder wenn es angeschaltet wird zum Kommunizieren mit der Gateway-Einheit oder wenn der Einstellknopf betätigt wird, und zum Erhalten der Konfigurationsinstruktion und der Registrierungsinstruktion von der Gateway-Einheit, wenn das Detektionsgerät einen Eintrag in der Gerätestatustabelle als ein neu hinzugefügtes Detektionsgerät aufweist.

4. Heimüberwachungssystem nach Anspruch 2, wobei die Gateway-Einheit ausgebildet ist zum Überprüfen, ob eine Bedingung erfüllt ist, in welcher die Gerätestatustabelle keinen Eintrag für das Detektionsgerät, welches als Master bestimmt ist, zeigt und einen Eintrag von zumindest einem verbleibenden Detektionsgerät zeigt, und zum Ausführen, wenn solch eine Bedingung erfüllt ist, einer Re-Konfigurationsroutine in Antwort auf einen Erhalt einer Konfigurationsnachfrage von irgendeinem der verbleibenden Detektionsgeräte, für welche ein Eintrag von der Gerätestatustabelle gelesen wurde, wobei die Re-Konfigurationsroutine folgende Schritte umfasst:

a) Löschen des Master/Folgegerätes und der Knotenzahl für alle der verbleibenden Detektionsgeräte von der Gerätestatustabelle;

b) Bestimmen als Masters eines der verbleibenden Detektionsgeräte, die mit der Gateway-Einheit zuerst, nachdem der Einstellknopf betätigt wurde, in Kommunikation gelangt sind, und Senden einer Konfigurationsinstruktion und der Registrierungsinstruktion zu den anderen der verbleibenden Detektionsgeräte in Antwort darauf, dass das Detektionsgerät durch Betätigen

des Einstellknopfes aktiviert wurde.

5. Heimüberwachungssystem nach Anspruch 1, wobei die Gateway-Einheit programmiert ist zum Erneuern seiner Gerätestatustabelle in Abstimmung mit der Geräteanmeldetabelle des Servers, in Antwort auf die Änderung des Anmeldeeintrages in der Geräteanmeldetabelle.
6. Heimüberwachungssystem nach Anspruch 1, wobei das Folgegerät programmiert ist zum Übertragen des Gefahrensignals als das Hilfe-anfragesignal zunächst an die Gateway-Einheit auf das Erzeugen des Gefahrensignals, und danach zum Übertragen des Gefahrensignals an den Master, wobei die Gateway-Einheit programmiert ist zum Übertragen des Hilfeanfragesignals an den Server auf das Erhalten des Hilfeanfragesignals von dem Master oder einem der Folgegeräte.
7. Heimüberwachungssystem nach Anspruch 1, wobei die Konfigurationsmittel für jeden der Detektionsgeräte programmiert sind zum Übertragen der Konfigurationsnachfrage in regulären Zeitintervallen an die Gateway-Einheit.
8. Heimüberwachungssystem nach Anspruch 1, wobei das erste Kommunikationsnetzwerk und das zweite Kommunikationsnetzwerk ausgebildet sind, individuelle Kommunikationsprotokolle, die sich voneinander unterscheiden, aufzuweisen.

Revendications

1. Système de surveillance pour la sécurité à domicile, comprenant :

- une pluralité de bornes de détection (50) agencées de manière à détecter une situation dangereuse au domicile d'un client et à générer un signal de danger, chacune desdites bornes de détection incluant un émetteur-récepteur radio (68) destiné à transmettre ledit signal de danger à l'autre borne de détection à travers un premier réseau de communication et un commutateur d'alimentation (52) ;

- un serveur basé sur un ordinateur (30), présentant une table d'inscription de bornes (37) agencée de manière à stocker un dossier d'inscription pour chacune de ladite pluralité de bornes de détection, ledit serveur présentant un processeur qui est agencé de manière à recevoir un signal de demande d'assistance issu d'au moins l'une desdites bornes de détection, ledit serveur présentant un moyen d'alerte (38) configuré de manière à fournir un rapport d'alerte en réponse à la réception dudit signal de de-

mande d'assistance, ledit dossier d'inscription incluant un code de borne prédéterminé destiné à désigner chacune desdites bornes de détection ;

- un dispositif d'entrée (100) apte à communiquer avec ledit serveur, par le biais d'un réseau informatique public, afin d'entrer et de mettre à jour ledit dossier d'inscription dans ledit serveur ; et

- une unité de passerelle (10) apte à être installée au domicile de chacun desdits clients, et incluant un moyen de communication (11) agencé de manière à communiquer avec ledit serveur par l'intermédiaire dudit réseau informatique public, et en outre à communiquer avec lesdites bornes de détection par le biais d'un second réseau de communication ;

dans lequel chacune desdites bornes de détection inclut une unité d'alarme (58) qui émet une alarme dès lors qu'une telle borne de détection génère ledit signal de danger ou reçoit un signal de danger de liaison en provenance de l'une des autres bornes de détection ;

chacune desdites bornes de détection étant agencée de manière à fonctionner de façon sélective en qualité de maître et d'esclave, ledit maître étant défini de manière à fournir ledit signal de danger de liaison lors de la réception dudit signal de danger en provenance de l'une quelconque des autres bornes de détection, et ledit esclave étant défini de manière à transmettre ledit signal de danger audit maître par l'intermédiaire dudit premier réseau de communication,

chacune desdites bornes de détection étant agencée de manière à générer et à transmettre ledit signal de demande d'assistance, à ladite unité de passerelle, à travers ledit second réseau de communication, lors de la génération dudit signal de danger ;

ladite unité de passerelle étant agencée de manière à relayer ledit signal de demande d'assistance audit serveur lors de la réception dudit signal de demande d'assistance ;

ladite unité de passerelle incluant un moyen d'affectation (16) agencé de manière à affecter, en tant que ledit maître, l'une desdites bornes de détection, mise sous tension par la manipulation du commutateur d'alimentation en vue d'établir, dans un premier temps, une communication avec ladite unité de passerelle, et à affecter, en tant que ledit esclave, l'autre borne de détection mise sous tension par la manipulation du commutateur d'alimentation en vue d'établir, ultérieurement, une communication avec ladite unité de passerelle ;

ladite unité de passerelle incluant une table d'états de bornes (17) stockant un index de maî-

tre / esclave indiquant si chacune desdites bornes de détection est affectée en tant que ledit maître ou en tant que ledit esclave, outre ledit dossier d'inscription pour chacune desdites bornes de détection ;

ladite table d'inscription de bornes dudit serveur étant agencée de manière à stocker ledit index de maître / esclave pour chacune desdites bornes de détection ;

ledit serveur étant programmé de manière à mettre à jour ledit index de maître / esclave dans ladite table d'inscription de bornes en réponse au fait que ledit moyen d'affectation de ladite unité de passerelle opère pour affecter ledit maître ou ledit esclave à celle correspondante desdites bornes de détection ;

ladite unité de passerelle étant programmée de manière à mettre à jour ladite table d'états de bornes en vue de refléter une modification apportée au dossier d'inscription de ladite table d'inscription de bornes ;

chacune desdites bornes de détection incluant une table d'enregistrement de bornes (67) configurée de manière à enregistrer ledit code de borne, ledit index de maître / esclave, et un numéro de noeud qui distingue mutuellement chacune desdites bornes de détection ;

ladite borne de détection étant configurée de manière à enregistrer dans ladite table d'enregistrement de bornes, lorsque ladite borne de détection est affectée en tant que ledit maître, ledit code de borne, ledit index de maître / esclave et ledit numéro de noeud pour la totalité desdites bornes de détection ;

ladite borne de détection étant configurée de manière à enregistrer, dans sa propre table d'enregistrement de bornes, lorsqu'elle est affectée en tant que ledit esclave, ledit code de borne, ledit index de maître / esclave, et ledit numéro de noeud qui lui est propre, outre ledit code de borne, ledit index de maître / esclave, et ledit numéro de noeud dudit maître ;

chacune desdites bornes de détection étant dotée d'un moyen de configuration et d'un bouton de réglage qui, lorsqu'il est manipulé, active ledit moyen de configuration de manière à transmettre une demande de configuration à ladite unité de passerelle et à recevoir de celle-ci une instruction de configuration selon laquelle ladite borne de détection est affectée en tant que ledit maître ou en tant que ledit esclave ;

ladite unité de passerelle étant agencée de manière à recevoir ladite demande de configuration en provenance de ladite borne de détection, et à lire ledit index de maître / esclave dans ladite table d'états de bornes, afin de préparer ladite instruction de configuration, qui affecte, en tant que ledit maître, la borne de détection transmet-

- tant ladite demande de configuration, uniquement lorsque ladite table d'états de bornes contient un dossier de la borne de détection transmettant ladite demande de configuration, et lorsqu'elle ne contient en outre aucun dossier d'une quelconque borne de détection déjà affectée en tant que ledit maître, et qui affecte, en tant que ledit esclave, l'autre borne de détection transmettant la demande de configuration, après que le maître est affecté à l'une des bornes de détection.
2. Système de surveillance pour la sécurité à domicile selon la revendication 1, dans lequel chacune desdites bornes de détection est agencée de manière à envoyer, à ladite unité de passerelle, une demande de configuration accompagnée de son propre code de borne, soit lorsqu'elle est mise sous tension en vue d'établir la communication dans un premier temps avec ladite première unité de passerelle, soit lorsque ledit bouton de réglage est manipulé ; ladite unité de passerelle étant programmée de manière à vérifier si ladite table d'états de bornes contient un dossier indiquant que la borne de détection envoie ladite demande de configuration, et à permettre audit moyen d'affectation d'émettre ladite instruction de configuration visant à affecter ledit maître ou ledit esclave à ladite borne de détection lorsque ladite table d'états de bornes contient le dossier indiquant que ladite borne de détection envoie ladite demande de configuration ; ledit moyen d'affectation étant agencé de manière à envoyer une instruction d'enregistrement à ladite borne de détection lorsque ladite table d'états de bornes contient un dossier indiquant qu'une telle borne de détection est affectée en tant que ledit esclave, ou lorsque ladite table d'états de bornes indique une modification dudit maître ; chacune desdites bornes de détection étant programmée de manière à mettre en oeuvre, en réponse à ladite instruction d'enregistrement, un enregistrement de borne qui exécute les étapes ci-dessous consistant à :
- inviter ledit maître à recevoir une permission, en provenance de ladite unité de passerelle, étant donné que ladite table d'états de bornes contient un dossier du code de borne correspondant à ladite borne de détection demanderesse ;
 - demander audit maître, suite à la réception de ladite permission, d'affecter ledit numéro de noeud à ladite borne de détection demanderesse, et d'envoyer ledit numéro de noeud ainsi affecté, à ladite unité de passerelle ;
 - demander audit maître de saisir le numéro de noeud ainsi affecté, conjointement avec le code de borne et ledit index de maître / esclave de la borne de détection demanderesse, dans ladite table d'enregistrement de bornes dudit maître ; et
 - stocker le numéro de noeud ainsi obtenu, conjointement avec ledit code de borne et ledit index de maître / esclave de la borne de détection demanderesse, outre le code de borne et un numéro de noeud prédéterminé dudit maître, dans ladite table d'enregistrement de bornes de la borne de détection demanderesse.
3. Système de surveillance pour la sécurité à domicile selon la revendication 2, dans lequel chacune desdites bornes de détection est agencée de manière à transmettre ladite demande de configuration, soit lorsqu'elle est mise sous tension en vue de communiquer avec l'unité de passerelle, soit lorsque ledit bouton de réglage est manipulé, et à recevoir ladite instruction de configuration et ladite instruction d'enregistrement en provenance de ladite unité de passerelle, lorsque ladite borne de détection est enregistrée dans ladite table d'états de bornes en tant qu'une borne de détection nouvellement ajoutée.
4. Système de surveillance pour la sécurité à domicile selon la revendication 2, dans lequel ladite unité de passerelle est configurée de manière à vérifier si une condition est satisfaite, dans laquelle ladite table d'états de bornes ne contient aucun dossier de la borne de détection affectée en tant que ledit maître, et contient un dossier d'au moins une borne de détection restante, et de manière à exécuter, lorsque cette condition est satisfaite, une routine de reconfiguration en réponse à la réception de ladite demande de configuration à partir de l'une quelconque des bornes de détection restantes dont le dossier est lu à partir de ladite table d'états de bornes, ladite routine de reconfiguration comprenant les étapes ci-dessous consistant à :
- a) supprimer, de ladite table d'états de bornes, ledit index de maître / esclave et ledit numéro de noeud pour la totalité des bornes de détection restantes ;
 - b) affecter ledit maître à l'une desdites bornes de détection restantes qui entre en communication avec ladite unité de passerelle dans un premier temps, après que son bouton de réglage a été manipulé, et envoyer ladite instruction de configuration et ladite instruction d'enregistrement à l'autre desdites bornes de détection restantes, en réponse à l'activation, au moyen de la manipulation dudit bouton de réglage, de ladite borne de détection.
5. Système de surveillance pour la sécurité à domicile

selon la revendication 1, dans lequel
 ladite unité de passerelle est programmée de ma-
 nière à mettre à jour sa table d'états de bornes en
 correspondance avec ladite table d'inscription de
 bornes dudit serveur, en réponse à la modification 5
 dudit dossier d'inscription dans ladite table d'inscrip-
 tion de bornes.

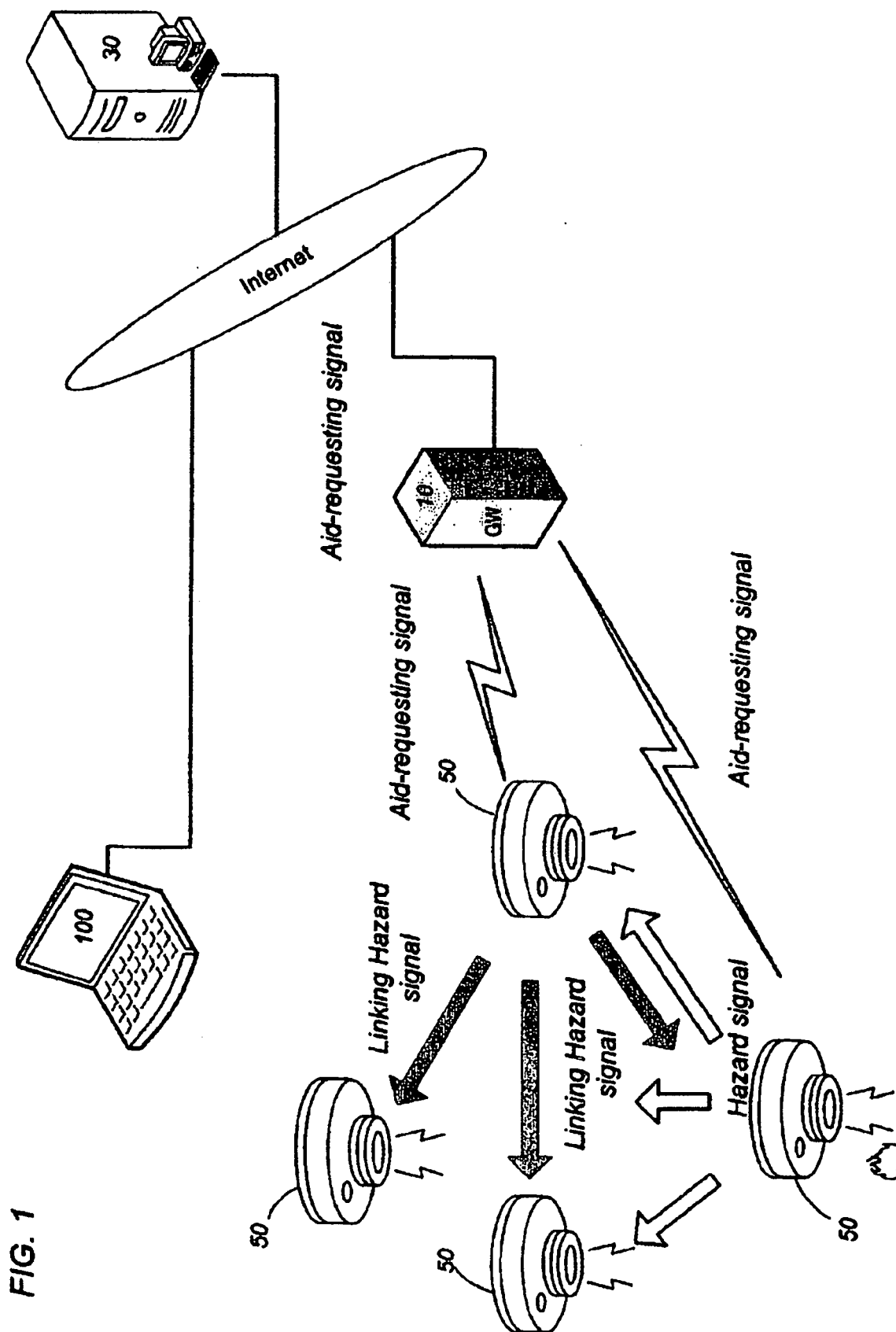
6. Système de surveillance pour la sécurité à domicile
 selon la revendication 1, dans lequel 10
 ledit esclave est programmé de manière à transmet-
 tre ledit signal de danger sous la forme dudit signal
 de demande d'assistance dans un premier temps, à
 ladite unité de passerelle, suite à la génération dudit
 signal de danger, et à transmettre ensuite ledit signal 15
 de danger audit maître ;
 ladite unité de passerelle est programmée de ma-
 nière à transmettre ledit signal de demande d'assis-
 tance audit serveur, suite à la réception dudit signal
 de demande d'assistance à partir de l'un quelconque 20
 dudit maître et dudit esclave.
7. Système de surveillance pour la sécurité à domicile
 selon la revendication 1, dans lequel
 ledit moyen de configuration de chacune desdites 25
 bornes de détection est programmé de manière à
 transmettre ladite demande de configuration à des
 intervalles de temps réguliers à ladite unité de pas-
 serelle. 30
8. Système de surveillance pour la sécurité à domicile
 selon la revendication 1, dans lequel
 ledit premier réseau de communication et ledit se-
 cond réseau de communication sont agencés de ma-
 nière à présenter des protocoles de communication 35
 individuels mutuellement distincts.

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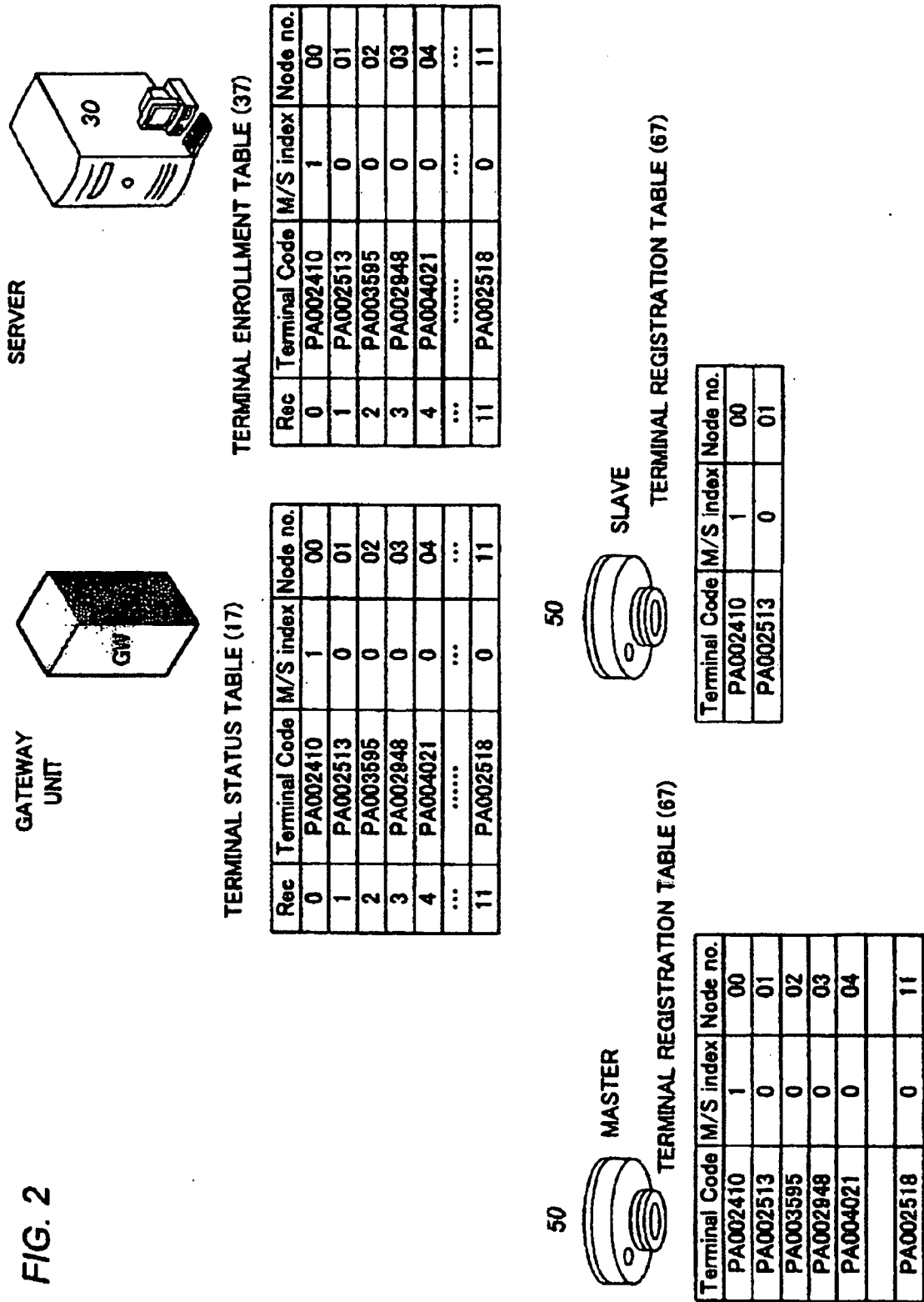


FIG. 3

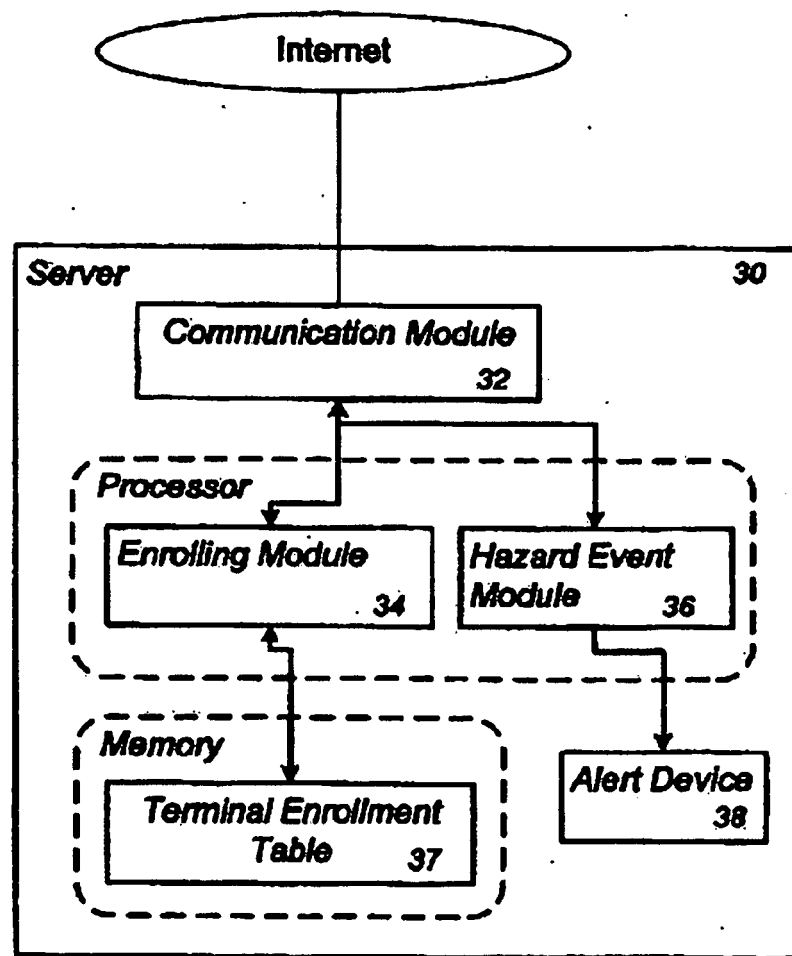


FIG. 4

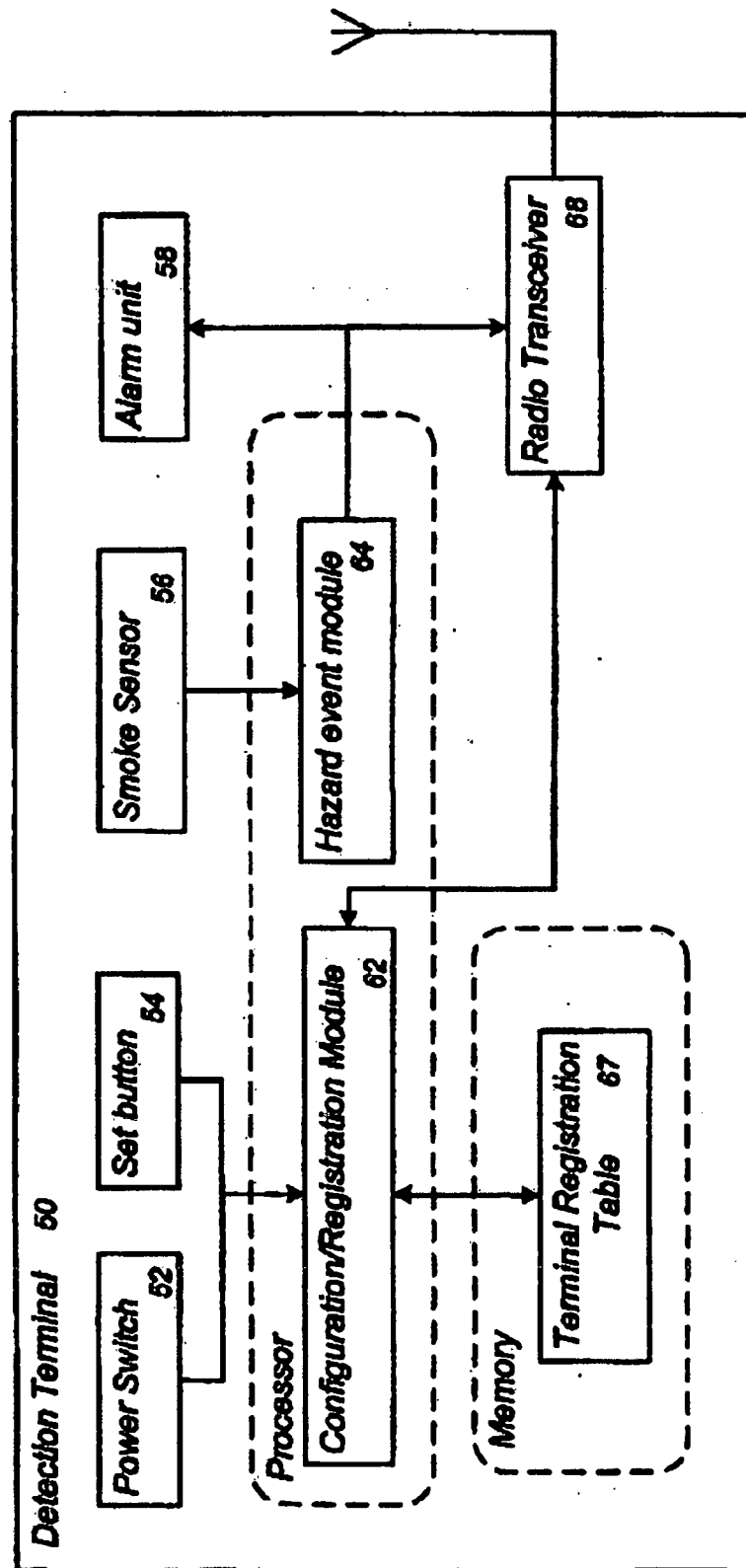


FIG. 5

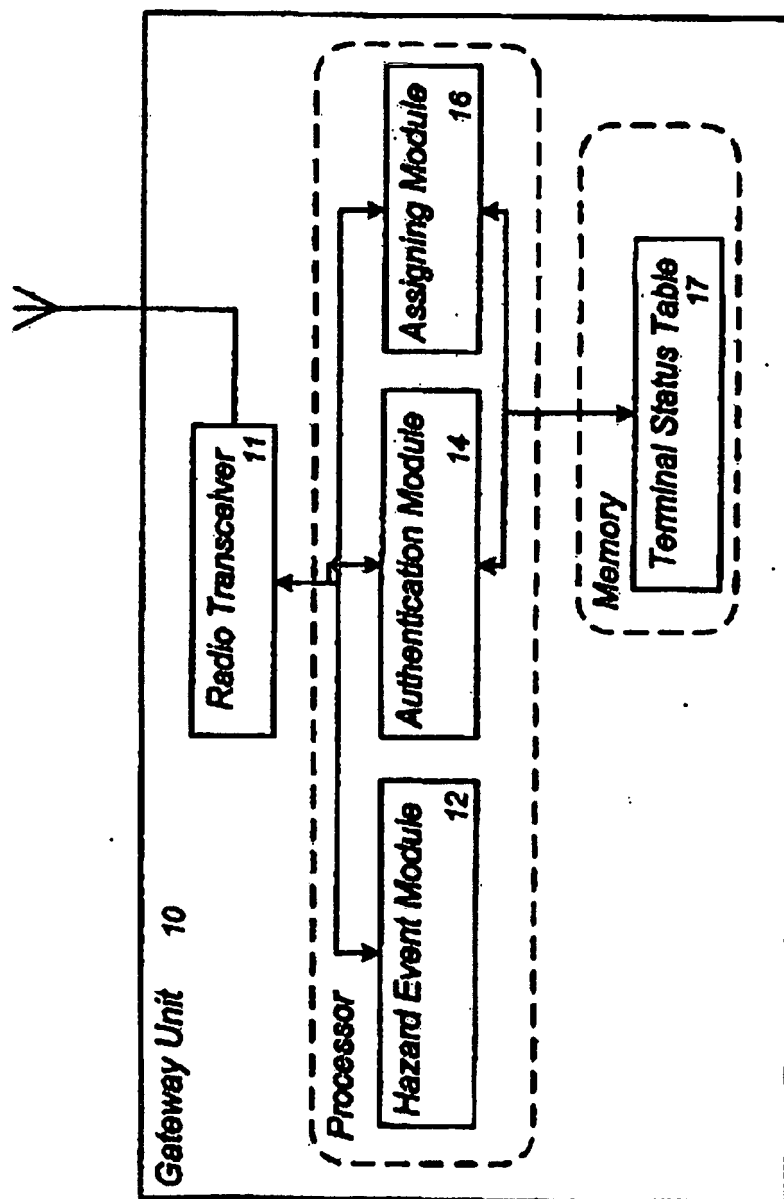


FIG. 6

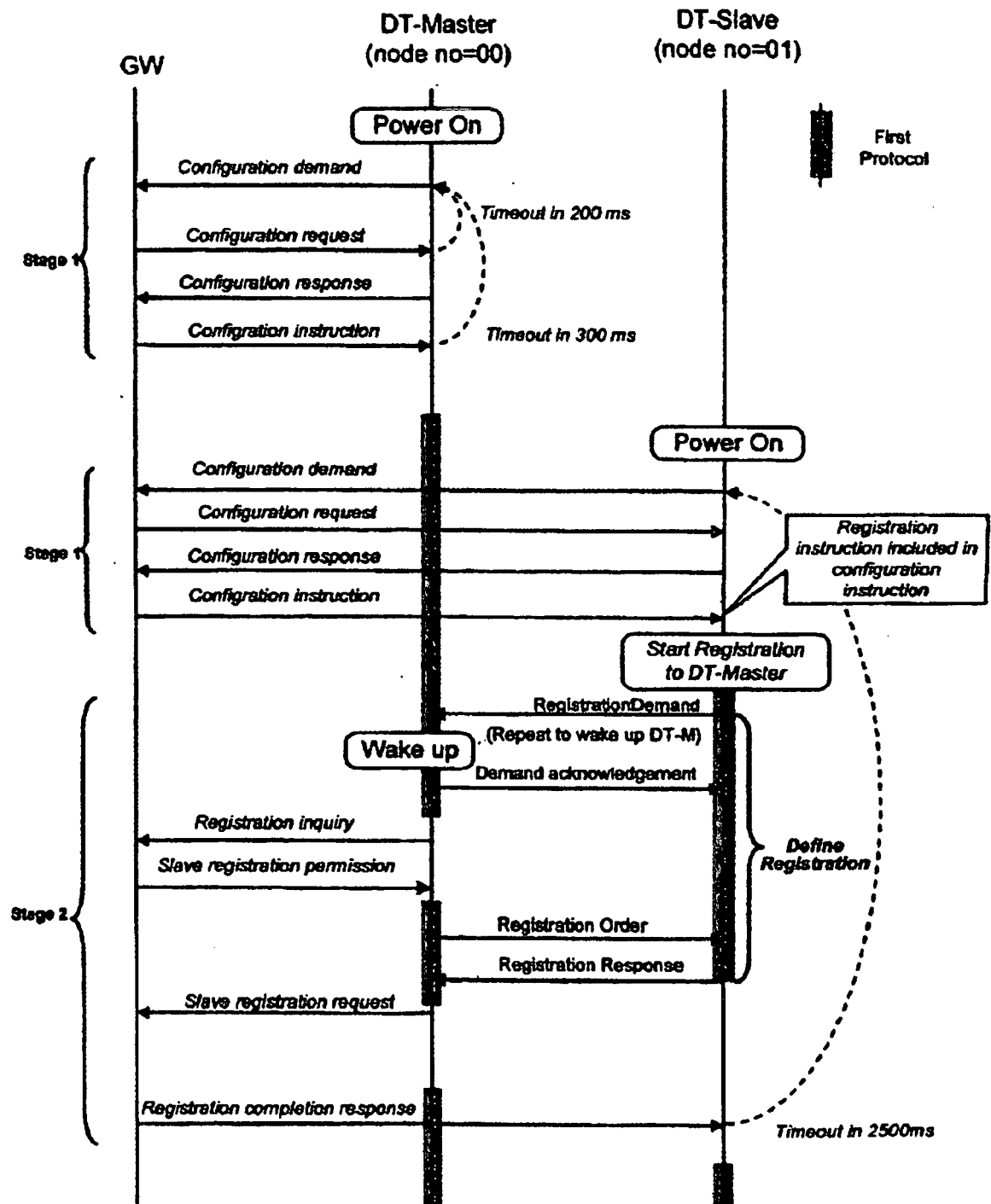


FIG. 7

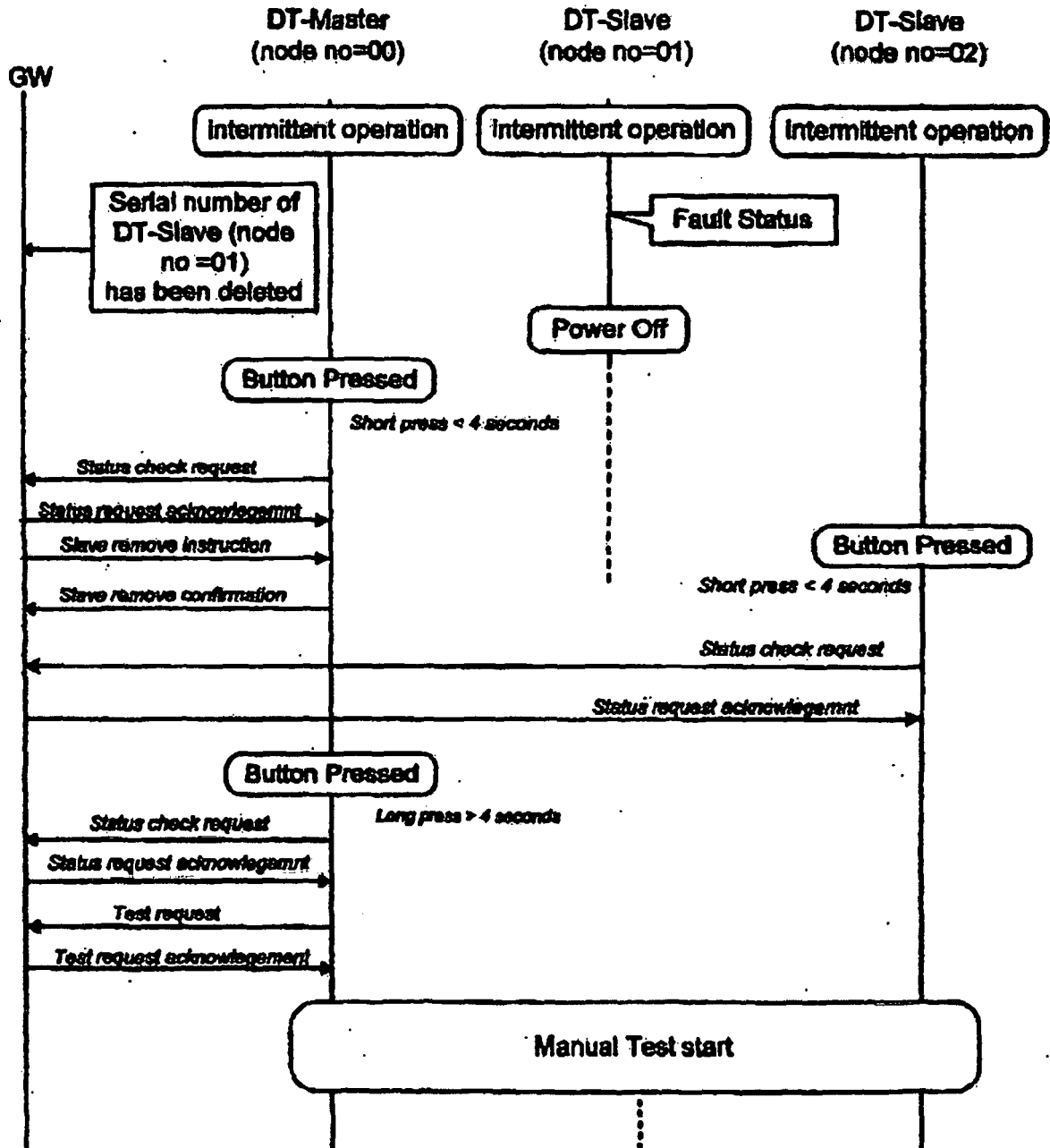


FIG. 8

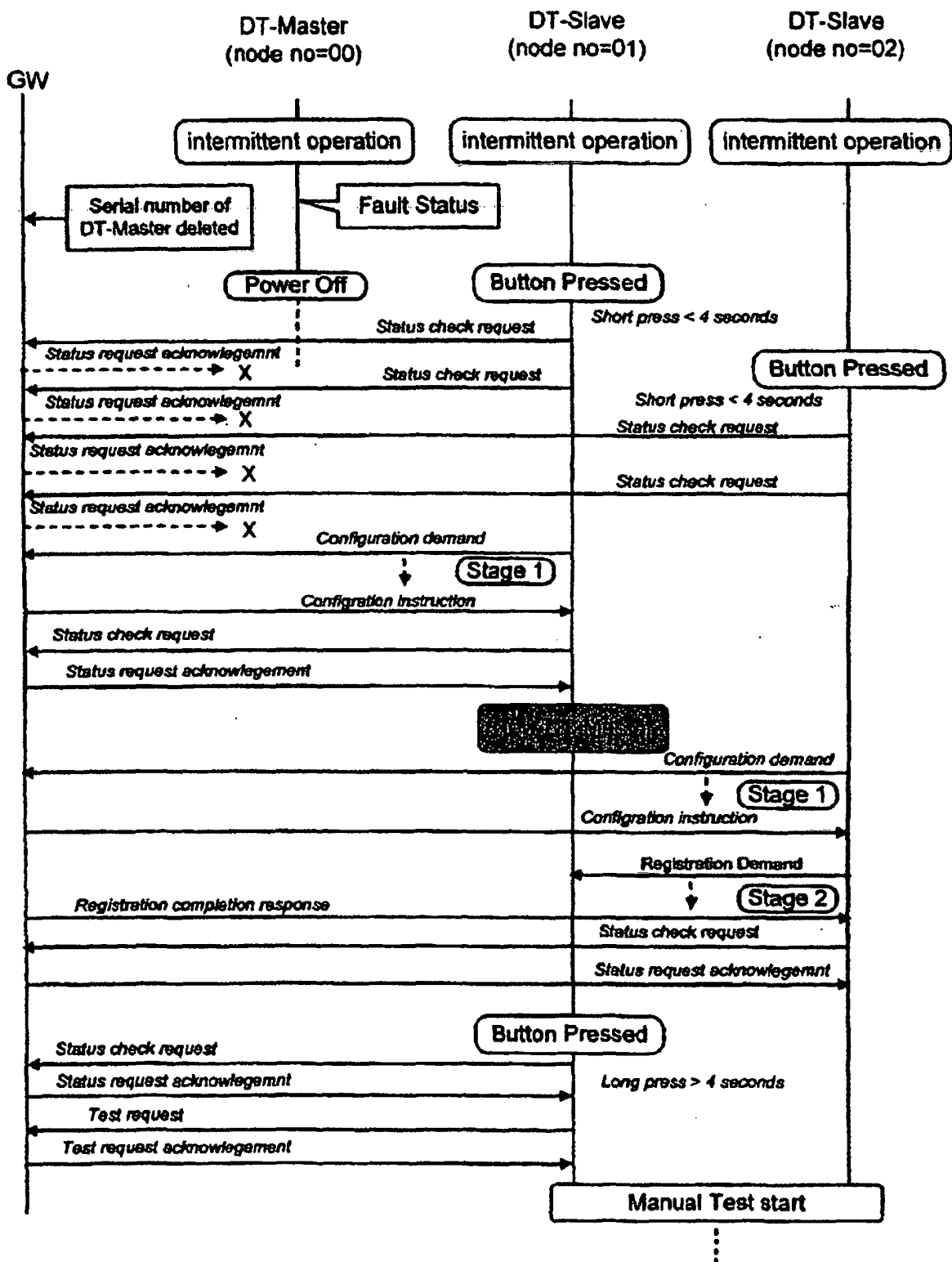


FIG. 9

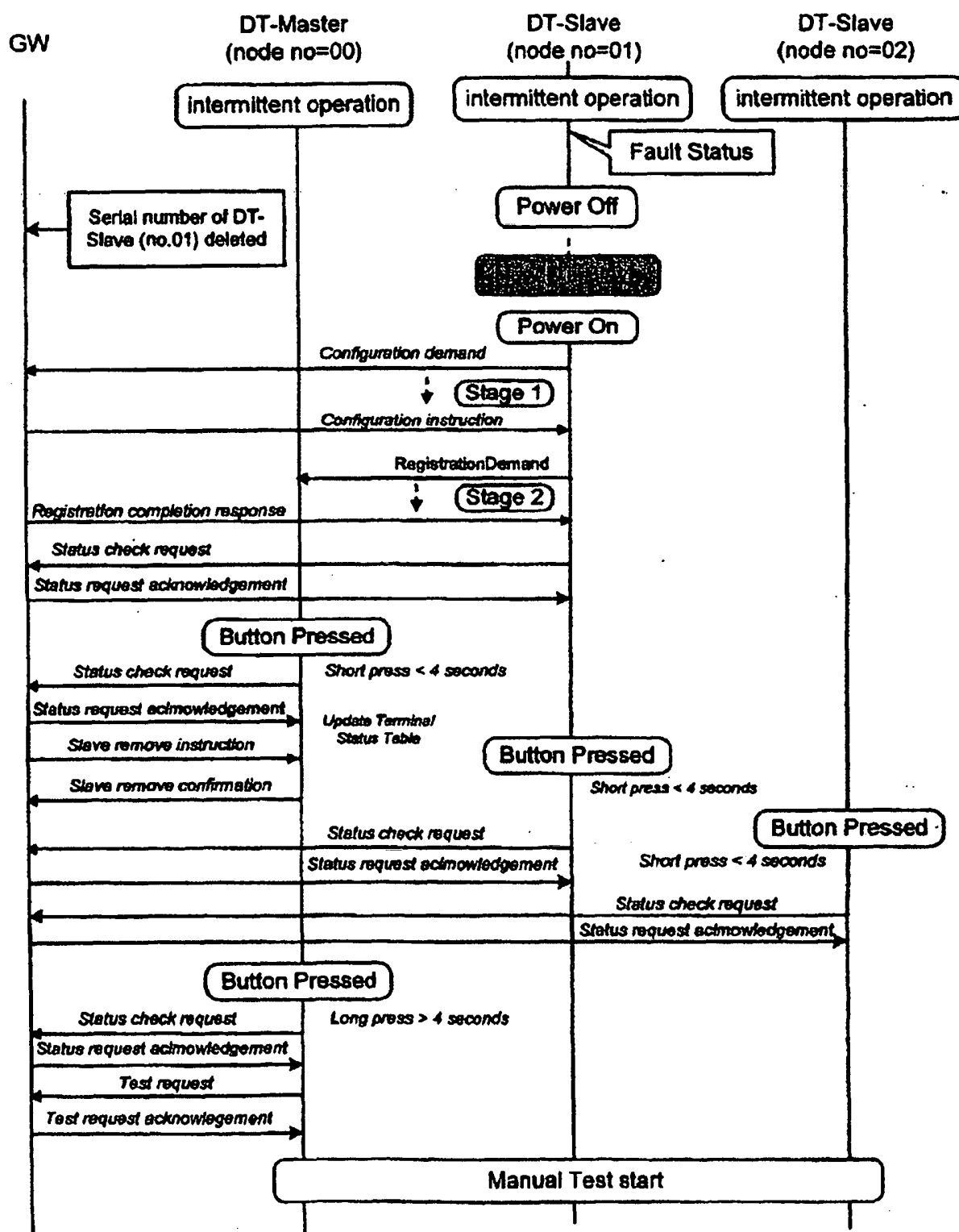
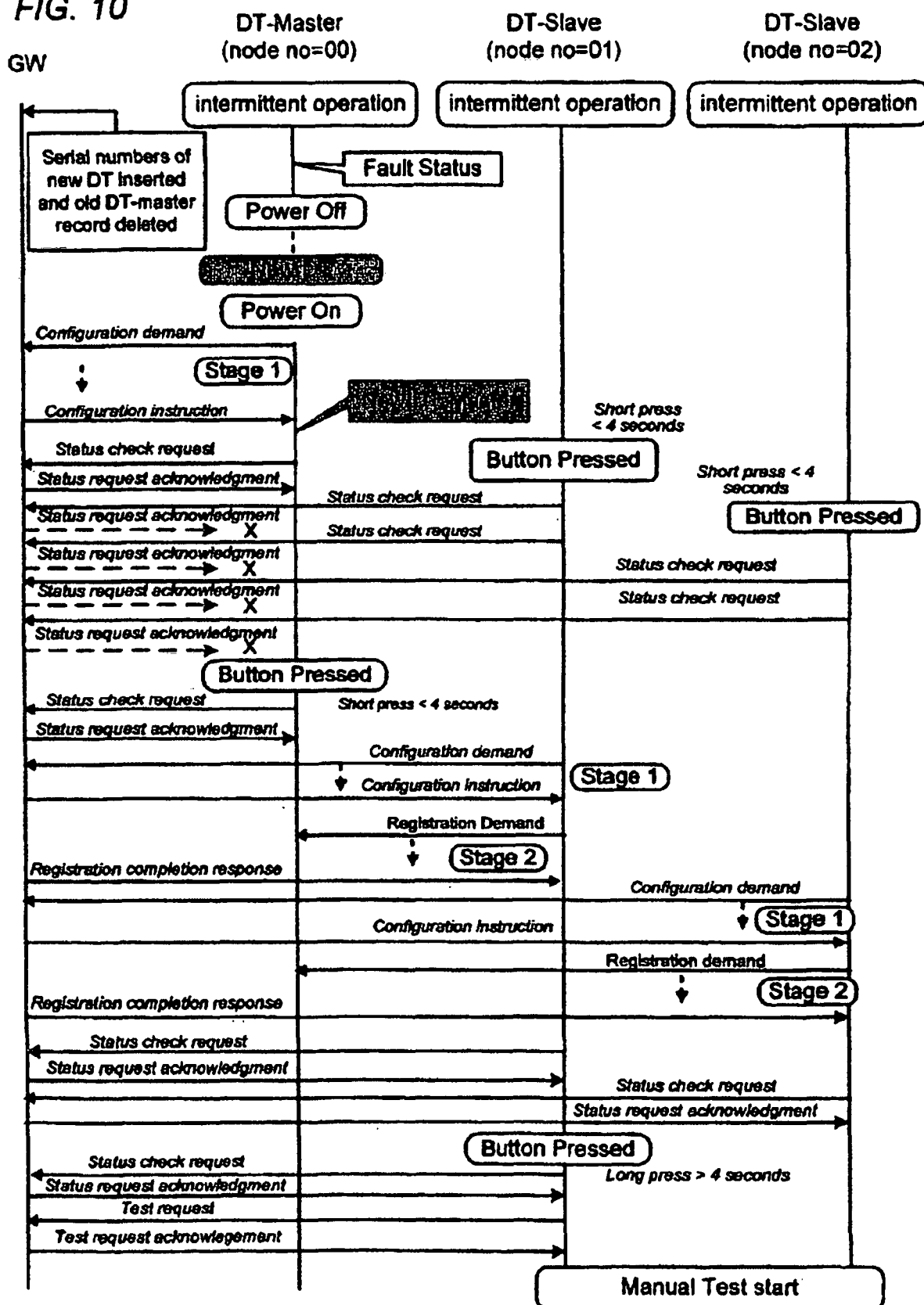
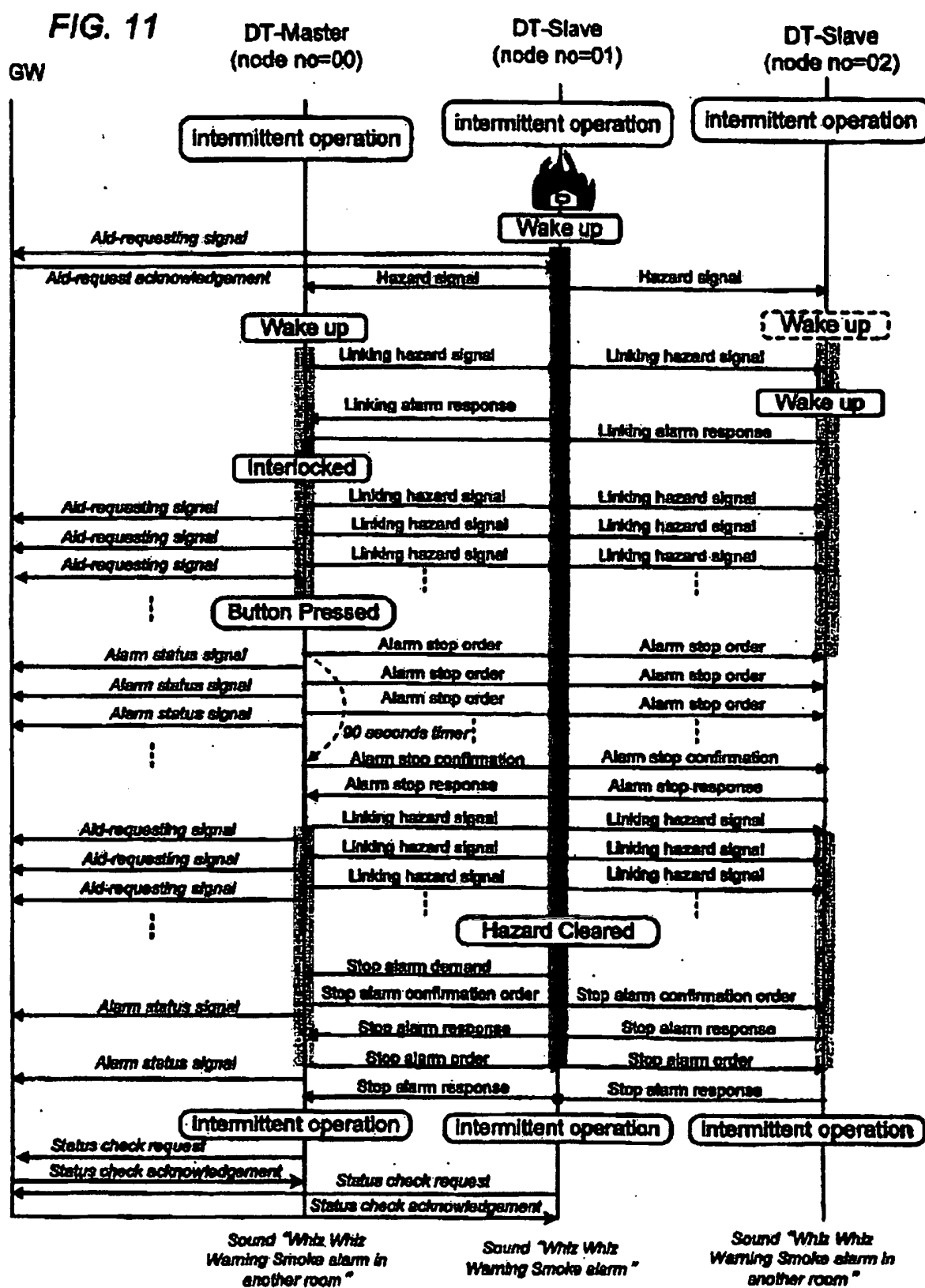


FIG. 10





REFERENCES CITED IN THE DESCRIPTION

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