

DESCRIPTION

INTERIOR SENSOR NETWORK BUILDING DEVICE AND METHOD

Technical Field

[0001]

The present invention relates to interior sensor network building devices and methods, and more particularly, to interior sensor network building devices and methods for building a sensor network capable of automatically collecting information from sensors that measure the amount of energy consumed by energy consuming devices, the amount of power generated by power generation apparatuses, and others.

Background Art

[0002]

Control systems for controlling the operating conditions of energy consuming devices such as electrical devices used in buildings have been known. Such control systems include one with a control device that communicates with energy consuming devices and remotely controls the operating conditions of the energy consuming devices (see Patent Document 1, for example).

[0003]

A system described in Patent Document 1 is an in-home electrical device remote control system that allows for the remote control of electrical devices in a home from outside the home by accessing the system using a mobile

communication terminal from outside the home. In Patent Document 1, in order to build this system, after electrical device installation in a home and wiring of electrical wiring equipment and the like, an in-home information distribution board device serving a function as a so-called home server is installed, so that the work of building the in-home network is conducted during construction work of the home.

[0004]

Then, in Patent Document 1, before the home is handed over to a client, an operation inspection is performed on whether the electrical devices in the home can be remotely controlled or not.

In this operation inspection, since it is done before the home is handed over to the client, a personal computer for inspection is directly connected to the in-home information distribution board device in a stand-alone state to communicate with the electrical devices in the home via the in-home information distribution board device, for performing operation checks of these devices. On the screen of the personal computer for inspection, a search screen, a setting site, or the like is displayed, and operation checks are performed on these screens.

This can prevent occurrence of inconvenience such as an outsider entering the inside of the home for inspection after a client moves in, or rework of the system required after a client has moved in.

Citation List

Patent Document

[0005]

Patent Document 1: JP 4653448 B1

DISCLOSURE OF THE INVENTION

Problem to be Solved by the Invention

[0006]

However, in a conventional art like Patent Document 1, since only the display of whether communication has succeeded or failed is given during communication checks, it is necessary to find out and determine which portion has a problem in connection by an inspection worker himself or herself.

Further, some of the number of circuits branching on the distribution board, the presence or absence of electric power measurement devices provided in the branch circuits or the like, and the presence or absence of various kinds of equipment such as a photovoltaic cell and a fuel cell cannot be automatically recognized, and thus need to be entered by an operator.

Moreover, although in a conventional art like Patent Document 1, an operation inspection is conducted on whether in-home electrical devices can be remotely controlled or not, there is no known art in which during building an in-home remote control system, operation inspection is conducted on energy creating equipment such as a photovoltaic power generation apparatus and a fuel cell, and an electric energy sensor of each electrical device.

[0007]

The present invention has been made in view of the above situation, and has an object of providing a device and a method for building an interior sensor network capable of automatically performing operation and connection checks on energy amount measurement sensors installed in a building.

Another object of the present invention is to provide a device and a method for building an interior sensor network capable of indicating to which device there is a problem in connection when connection has failed during automatic operation and connection checks of the energy amount measurement sensors installed in the building.

Means for Solving Problem

[0008]

The invention according to an embodiment solves the above problem by a device for building a network between an device, a sensor for measuring the amount of energy, and a server, which are installed in a building, that includes a section for attempting automatic connection to a router and the server, a section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to the router or the sever has failed, a section for attempting automatic connection to the device and the sensor via the router and the server when the connection to the router and the server has succeeded, a section for displaying a device not connected successfully and a matter considered to be the

cause of a connection failure when the connection to any of the device and the sensor has failed, a section for displaying the operation check status and installation locations in the building of the device and the sensor connected successfully, and a section for registering information on the result of the automatic connection attempt, the operation check status, and the installation locations on the device and the sensor connected successfully, in a check result storage section.

[0009]

The invention according to an embodiment solves the above problem by a method for building a network between an device, a sensor for measuring the amount of energy, and a server, which are installed in a building, that includes the steps of attempting automatic connection to a router and the server by a computer, displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to the router or the sever has failed, attempting automatic connection to the device and the sensor via the router and the server when the computer has succeeded in connecting to the router and the server, displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to any of the device and the sensor has failed, displaying the operation check status and installation locations in the building of the device and the sensor connected successfully, and registering information on the result of

the automatic connection attempt, the operation check status, and the installation locations on the device and the sensor connected successfully, in a check result storage section.

[0010]

This configuration allows for automatic operation checks and connections at the server on not only the electrical devices in the building but also the sensors measuring the amounts of energy.

Further, since the section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when connection to the router or the sever has failed, and the section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when connection to any of the device and the sensor has failed are included, when a connection check has failed during automatic operation and connection checks, it can be found immediately in which stage the failure occurred. Thus time and effort taken for building the sensor network in the building can be saved.

Furthermore, since a section for storing an electronic file in which a list is stored under a file name containing identification information identifying the building in a connected device list storage section when a Save button is clicked is included, information on the building on whether operation and connection checks of the devices and the sensors have been completed or not, or to which stage they

have been completed when they have been partly completed can be saved.

[0011]

It may be a computer of a business operator that provides the building to a user of the building.

This configuration allows the business operator to provide the building to build the interior sensor network.

[0012]

A section for displaying a Save button for saving a list of the devices, the sensors, and the installation locations of the devices and the sensors, on condition that connections to all of the devices and the sensors to be targets of the network have succeeded, and a section for storing an electronic file in which the list is stored under a file name containing identification information identifying the building in a connected device list storage section when the Save button is clicked may further be included.

This configuration allows information on the installation locations of the devices and the sensors registered in the list stored in the electronic file to be used for a so-called home energy management system (HEMS) that controls electric devices used in the building.

[0013]

The sensor for measuring the amount of energy measurement may be a sensor selected from a group including an electric energy meter attached to a circuit provided on a distribution board of the building, a pulse sensor for

measuring the amount of water or gas used, a pulse sensor for measuring the amount of gas used, and a generated power amount sensor for measuring the amount of power generated by a power generation apparatus.

This configuration allows for the building of an interior sensor network covering various sensors provided in a building.

[0014]

A section for determining whether a connection ID entered for permission of connection to the router agrees with a predetermined ID for connection to a network commonly used by the building device when release of the connection with the router is instructed, and when it agrees, stopping the release of the connection with the router may further be included.

This configuration prevents the connection ID used for connecting to the router from being automatically deleted at the release of the connection with the router even when it agrees with the predetermined ID for connecting to a network commonly used in a workplace or the like.

[0015]

The server may include a protocol switching section capable of controlling the devices and the sensors by switching between communication protocols used when a control signal is transmitted to the devices and the sensors, according to communication protocols used by the devices and the sensors at transmission destinations, when the devices and the sensors include devices that

communicate on communication protocols different from each other.

The above configuration allows the user to request the server to control the devices and the sensors without being conscious of the difference in the communication protocols by the protocol switching section switching between the communication protocols according to the other end of communication.

Advantageous Effects of the Invention

[0016]

According to the interior sensor network building device of the present invention, automatic operation checks and connections at the server become possible on not only electrical devices in a building but also sensors measuring the amount of energy.

Further, since the section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when connection to the router or the sever has failed, and the section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when connection to any of the device and the sensor has failed are included, when a connection check has failed during automatic operation and connection checks, it can be found immediately in which stage the failure occurred. Thus time and effort taken for building the sensor network in the building can be saved.

Furthermore, since the section for storing an

electronic file in which a list is stored under a file name containing identification information identifying the building in the connected device list storage section when the Save button is clicked is further included, information on the building on whether operation and connection checks of the devices and the sensors have been completed or not, or to which stage they have been completed when they have been partly completed can be saved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is an entire block diagram of an in-home sensor network according to an embodiment of the present invention;

Fig. 2 is a hardware block diagram of a terminal computer according to the embodiment of the present invention;

Fig. 3 is a flowchart showing the flow of building the in-home sensor network according to the embodiment;

Fig. 4 shows a TOP screen and a router connection screen of a check tool program;

Fig. 5 is a flowchart showing processing of the check tool program;

Fig. 6 shows check screens for checking the connection status of a terminal, a router, and a home server executing the check tool program;

Fig. 7 is a flowchart showing processing of the check tool program;

Fig. 8 shows a Connected Device Check Screen for performing connection checks of sensors, air conditioners, and a storage battery;

Fig. 9 shows a sensor data entry screen for entering data on the sensors in advance before connection checks of the sensors;

Fig. 10 shows a Branch Sensor List screen and an Other Sensor List screen displaying the status of connection checks of the sensors;

Fig. 11 is a flowchart showing processing of the check tool program;

Fig. 12 is a flowchart showing processing of the check tool program;

Fig. 13 shows an operation check result screen showing the results of connection checks executed by the check tool program and a connected device list file for saving the content;

Fig. 14 is a flowchart showing processing of the check tool program;

Fig. 15 shows an Air Conditioner List screen displaying the status of connection checks of air conditioners;

Fig. 16 is a flowchart showing processing of the check tool program;

Fig. 17 is a flowchart showing processing of the check tool program; and

Fig. 18 shows a Storage Battery List screen displaying the status of a connection check of a storage battery.

DETAILED DESCRIPTION OF THE INVENTION

[0018]

Hereinafter, an embodiment of the present invention will be described with reference to the drawings. A configuration described below is not intended to limit the present invention, and can be altered in various ways within the scope of the present invention as a matter of course.

(In-home Sensor Network)

An in-home sensor network in this embodiment is a sensor network for monitoring the energy generation and consumption status in a home as a building, and is an information network that allows for transmission and reception of information between electric energy sensors installed in branch circuits on a distribution board or the like in a home, generated power amount sensors for power generation apparatuses, pulse sensors for gas and water, and others, and a home server, and is used for a so-called home energy management system (HEMS) for controlling electrical devices used in a home 2.

The HEMS is a system that visualizes power consumption by a plurality of electrical devices used in the home 2, and notifies a user of the home 2 of the visualized information in managing energy consumption in the home 2. Through the in-home sensor network in this embodiment, the home server acquires data on the amount of power used by each piece of electrical equipment, the amount of power

generated by a power generation apparatus, the amount of gas and water used, and the like to visualize the amount of energy consumption and the amount of power generation.

[0019]

Fig. 1 is an entire block diagram of an in-home sensor network.

The in-home sensor network includes a home network 21 built in the home 2 and controlled by a home server 10 as a server, and a terminal computer 51 (hereinafter, referred to as terminal 51) connected to the home network 21 via a router 13 in the home 2 to be able to communicate with it.

The home 2 is an example of a building. The present invention can be applied to a case of controlling energy consuming equipment used in a building other than the home 2, such as a commercial building, a building in a factory, or a store. The home 2 is an idea including an apartment in an apartment house such as a condominium as well as a detached house.

The home server 10 may be connected to the Internet not shown via the router 13 to be able to communicate with a server computer of a housing management company through the Internet to allow a resident of the home 2 to use services provided on the Web from the housing management company.

[0020]

In the home 2, the home network 21 connecting rooms, which is called a home LAN, is built. To the home network 21, as shown in Fig. 1, the home server 10, branch sensors

11a for measuring the amount of electricity in the circuits, power measurement taps 11b for measuring the amount of power consumption of electrical devices, a data logger 11g for temporarily storing data on the amount of consumed and generated power measured by the branch sensors 11a, the power measurement taps 11b, a generated power amount sensor 11c, a generated power amount sensor 11d, a gas pulse sensor 11e, and a water pulse sensor 11f and transmitting it to the home server 10, a display 12 on which a resident views information on the amount of use of consumed power and the like and controls electrical devices and others in the home 2, the router 13 interconnecting the home network 21 and an external network such as the Internet, various electrical devices such as air conditioners and lighting, a distribution board 30, a photovoltaic power generation apparatus 41, a fuel cell 42, a storage battery 43 for storing electric power generated by the photovoltaic power generation apparatus 41 and the fuel cell 42, the gas pulse sensor 11e, and the water pulse sensor 11f are connected.

[0021]

The home server 10 is a device for managing information in the home network 21, and has a device management function of managing addresses of devices such as the display 12, the distribution board 30, the photovoltaic power generation apparatus 41, and electrical devices 23 connected to the home network 21, and communicating with these devices, acquiring information such as the status of the devices, and controlling the

status of the devices. The home server 10 is implemented in the form of being incorporated in a server computer, a personal computer, a set-top box, or another existing device, or the like. The hardware configuration of the home server 10 is similar to that of the terminal 51, and will not be described.

[0022]

By the way, in the home 2 equipped with a HEMS, it is generally recommended to use electrical devices adopting a common communication protocol (synonymous with a communication scheme and a communication standard). For example, it is desired that devices adopt a common communication protocol proposed by the ECHONET Consortium. On the other hand, protocols proposed by the ECHONET Consortium include ECHONET (registered trademark) and ECHONETLite (recorded trademark) that is a succeeding standard of the ECHONET, and both the protocols sometimes coexist in electrical devices in the home 2. Further, some electrical devices purchased by the user may include devices outside a communication protocol other than ECHONET and ECHONETLite.

[0023]

In the home network 21, among the plurality of electrical devices and sensors used in the home 2, there are devices that communicate on communication protocols different from each other. Therefore, in a storage section of the home server 10, a communication bundle for the home server 10 to communicate with the other end of

communication in the home 2 is stored for each communication protocol. That is, the same number of communication bundles as the number of types of communication protocols adopted by the electrical devices and the sensors in the home 2 are stored in the storage section. To explain specifically, in the storage section, a bundle for communication using a first communication protocol (e.g. ECHONET), a bundle for communication using a second communication protocol (e.g. ECHONETLite), and a third communication protocol (e.g. a communication protocol other than ECHONET and ECHONETLite) are stored.

[0024]

In the home network 21, among the communication bundles stored in the storage section, a communication bundle read and executed changes according to the other end of communication. This allows the home server 10 to switch between the communication protocols adopted when communicating with the electrical devices and the sensors, according to the communication protocols adopted by the electrical devices and the sensors at the other end of communication. A switch between communication protocols is synonymous with a rewrite of a telegraphic message (command) transmitted on a certain communication protocol in conformity with a different communication protocol for transmission to a communication device using the different communication protocol. Electrical devices at the other end of communication with which the home server 10 switches between communication protocols for communication include

the data logger 11g in this embodiment.

[0025]

Here, a program execution environment in the home server 10 will be described. The home server 10 includes an OS, a JAVA (registered trademark) Virtual Machine (hereinafter, JVM), an Open Services Gateway initiative (OSGi) framework, and various bundles to be operated on the OSGi framework. The OSGi framework is built on the JVM, and manages the lifecycle of a bundle operated on the OSGi framework, such as download, installation, a start, and a stop. Bundles operated on the OSGi framework can be dynamically changed, and a plurality of bundles can be executed in parallel.

[0026]

Here, the bundles operated on the OSGi framework include a first communication bundle for communication using the above-described first communication protocol, a second communication bundle for communication using the second communication protocol, and a third communication bundle for communication using the third communication protocol. Among functions of the OSGi framework, a function of dynamically changing the bundles allows for changing of communication bundles to be executed, according to the communication protocols of the electrical devices and the sensors to be the other ends of communication when the home server 10 communicates. The change of communication bundles causes switching between communication protocols to be adopted by the home server 10.

As a result, the home server 10 can communicate with the electrical devices and the sensors in the home 2, regardless of whether their communication protocols are the same or different.

[0027]

Further, when each communication bundle is registered in the OSGi framework, an interface for using the function of each communication bundle is registered in a service registry. The OSGi framework provides the integration of these interfaces as an Application Program Interface (API). The use of the API eliminates the need for the user to be conscious of the difference between the communication bundles, that is, the difference in the communication protocols between the electrical devices and the sensors. That is, when developers develop a program for requesting the home server 10 to control the electrical devices and the sensors, this allows them to use a general Web communication program development method only by grasping object requirements on the electrical devices and the sensors.

[0028]

The use of the API for requesting the home server 10 to communicate with the electrical devices and the sensors in the home 2 eliminates the need for preparing a request telegraphic message therefor in a format according to the communication protocols, resulting in a relatively simple telegraphic message. To explain more specifically, when a resident requests the home server 10 to control the

electrical devices and the sensors, an HTTP request, specifically, an execution request for the control of the electrical devices and the sensors is transmitted from the display 12 to the home server 10. On the other hand, when the home server 10 receives the HTTP request from the display 12, it communicates with the electrical devices and the sensors and transmits control signals to the electrical devices and the sensors. As a result, the home server 10 controls the electrical devices and the sensors as control targets, based on a control rule specified in the HTTP request. Here, communication protocols adopted by the home server 10 when transmitting the control signals are set as the communication protocols adopted by the electrical devices and the sensors at the destinations of the control signals.

[0029]

The home server 10 further communicates with the electrical devices and the sensors having received the control signals, and receives response signals indicating the operating conditions of the electrical devices and the sensors. At this time, communication protocols adopted by the home server 10 are set as the communication protocols adopted by the electrical devices and the sensors at the sources of the response signals.

[0030]

As above, in the home network 21, interactive communication is executed between the home server 10 and the electrical devices and the sensors. Specifically,

control signals are transmitted from the home server 10 to the electrical devices and the sensors, and response signals are transmitted from the electrical devices and the sensors to the home server 10.

The display 12 is a display installed in a place such as in a kitchen, a living room, or a lavatory in the home 2, and having a function of transmission and reception to and from the home server 10 and a touch panel. A display device 69 of the home server 10 may be used as the display 12.

[0031]

Electrical devices 23 are a general term for devices used in a home, and include every electrical device in a home such as household electrical devices such as a refrigerator and a microwave oven, a game machine, audio and video equipment, as well as sensors and lighting.

When each of the electrical devices according to this embodiment is connected to the home server 10 to be able to communicate with it, it is automatically recognized at the home server 10. To explain specifically, among the electrical devices according to this embodiment, household electrical devices such as air conditioners and lighting are devices adopting the ECHONET standard proposed by the ECHONET Consortium, or devices adopting a standard in compliance with the ECHONET standard. When such an electrical device is connected to the home server 10 to be able to communicate with it by the ECHONET standard, it is automatically recognized at the home server 10, and further

registered as an device used in the home 2 in the home server 10. Here, as a technology for automatically recognizing an electrical device and registering it, a known technology such as Plug and Play (registered trademark) technology can be used.

[0032]

The distribution board 30 is provided with a main circuit 31 that is a main electric power supply circuit in the entire home 2, and a plurality of branch circuits 32 branching from the main circuit 31. The branch sensors 11a formed by known electric energy meters are attached to the main circuit 31 and the branch circuits 32.

Since the main circuit 31 and the branch circuits 32 are associated with predetermined power consuming devices such as air conditioners and lighting used in the home 2, by individually measuring the amount of electricity of flowing currents from current measurement values and voltage measurement values of currents flowing through the main circuit 31 and the branch circuits 32, the amount of power consumption of the power consuming devices associated with the main circuit 31 and the branch circuits 32 can be measured.

[0033]

Among the power consuming devices used in the home 2, an device that is not provided with a dedicated power supply circuit and is not associated with any branch circuit 32 is connected to a known power measurement tap 11b. The power measurement taps 11b measure the amount of

power consumption.

The photovoltaic power generation apparatus 41 is formed by a known photovoltaic power generation apparatus, to which a known generated power amount sensor 11c for detecting the amount of electric power generated by the photovoltaic power generation apparatus 41 is connected.

The fuel cell 42 is formed by a known fuel cell, to which a known generated power amount sensor 11d for detecting the amount of electric power generated by the fuel cell 42 is connected.

The gas pulse sensor 11e and the water pulse sensor 11f are known pulse sensors that detect the amount of gas used and the amount of water used in a home, respectively.

[0034]

The branch sensors 11a, the power measurement taps 11b and the generated power amount sensor 11c output data showing the amount of power consumption, the gas pulse sensor 11e, data showing the amount of gas consumption, the water pulse sensor 11f, data showing the amount of water consumption, as measurement results. These pieces of data are temporarily stored in the data logger 11g, and are transmitted from the data logger 11g to the home server 10 at predetermined time intervals such as at one minute intervals.

[0035]

The terminal 51 is a computer used by a person in charge of the home builder to perform operation checks and the like on the home server 10, the other electrical

devices, and others connected to the home network 21 in the home 2.

The hardware configuration of the terminal 51 is shown in Fig. 2. The terminal 51 includes a CPU 61 as a data operation and control processing device, a RAM 62, a ROM 63, an HDD 64, and a storage medium device 65 as storage devices, and others. The CPU 61 executes various kinds of processing according to programs stored in the ROM 63 or the HDD 64. In the RAM 62, data necessary for the CPU 61 to execute various kinds of processing, and others are stored.

[0036]

In the HDD 64, a check tool program for executing checks of connections with and operations of the sensors 11a to 11f, the air conditioners, and the storage battery 43, and initial registration of names, installation locations, and others in a database of the home server 10 is stored. Processing executed by the check tool program is processing in step S7 in Fig. 3, and specifically, processing in flowcharts in Figs. 5, 7, 11, 12, 14, 16, and 17.

Also in the HDD 64, a connection and operation check result table on each home 2 for storing results of whether connection and operation checks of the sensors, the air conditioners, and the storage battery 43 by the check tool program have been completed or not is stored. The connection and operation check result table contains, as items, an identification number unique to the home 2, an IP

address of the router 13, a completion flag indicating whether connection and operation checks of the sensors have been completed or not, a completion flag indicating whether connection and operation checks of the air conditioners have been completed or not, and a completion flag indicating whether a connection and operation check of the storage battery 43 has been completed or not. For the completion flags, 1 represents completion, and 0 represents non-completion.

In the HDD 64, a check result folder for storing a file containing data on the status of the connection and operation checks of the sensors, the air conditioners, and the storage battery 43 executed by the check tool program on the home 2 is stored. In the check result folder, a sensor check result file for storing data on a Branch Sensor List screen 190 and an Other Sensor List screen 200, an air conditioner check result file for storing data on an Air Conditioner List 231, and a storage battery check result file for storing data on a Storage Battery List 251 are stored, each under a file name containing the identification number unique to the home 2 and a symbol indicating whether it is on sensors, air conditioners, or storage batteries.

In the HDD 64, a connected device list folder for storing a connected device list file 214 in Fig. 13 containing a list of the sensors, the air conditioners, and the storage battery 43 on which connection and operation checks by the check tool program have been completed, and

information on the results of the operation checks and others on the home 2 is stored. To the connected device list file 214, a file name containing the identification information unique to the home 2 is attached.

[0037]

The storage medium device 65 is constituted by an external hard disk, a CD-R, a DVD, a memory stick, or the like, and is configured to be able to store and read received data, or do something like that.

[0038]

(In-home Sensor Network Building Method)

Next, an in-home sensor network building method will be described.

First, with reference to Fig. 3, the flow of building an in-home sensor network in this embodiment will be described.

First, the home builder conducts a study on specifications of a sensor network based on the in-home equipment configuration, option settings, and others (step S1). Subsequently, it creates a drawing based on adopted network configuration specifications, the in-home equipment configuration, and others (step S2).

[0039]

Then, based on the created drawing, electrical device installation work is conducted (step S3). In this step, the home builder and an electrical work operator conduct electrical wiring and install electrical devices in the home. At this time, the home server 10 and the display 12

are also installed.

The electrical work operator conducts installation work of the distribution board 30, the sensors 11a to 11f, and the data logger 11g (step S4).

[0040]

Then, when the installation work of the electrical devices, the distribution board 30, the sensors 11a to 11f, and the data logger 11g by the home builder in steps S3 and S4 has been completed, the person in charge of the home builder inspects the connections, the wiring, the presence or absence of energization, the operations, and the like of the electrical devices (step S5).

[0041]

Next, the person in charge of the home builder connects the terminal 51 to the router 13, and performs a connection and operation check between each electrical device and the home server 10, and initial registration of the names, installation locations, and others of all the electrical devices in the database of the home server 10 (step S6). In this step, connections of the branch sensors 11a, the power measurement taps 11b, the generated power amount sensor 11c, the generated power amount sensor 11d, the gas pulse sensor 11e, and the water pulse sensor 11f to the data logger 11g, and their initial registration are also performed.

In this embodiment, an example in which the home server 10 is connected to the Internet via the router 13, and the terminal 51 is connected to the home server 10 via

the Internet and the router 13 from a location away from the home 2 will be described. Alternatively, the person in charge may bring the terminal 51 into the home 2 to directly connect the terminal 51 to the home server 10 in a standalone state not connected to the Internet in the home 2.

Thereafter, the terminal 51 is connected to the router 13 to perform checks of connections with and operations of the sensors 11a to 11f, the air conditioners, and the storage battery 43, and initial registration of the names, installation locations, and others in the database of the home server 10 (step S7).

When the checks of connections with and operations of the sensors 11a to 11f, the air conditioners, and the storage battery 43, and the initial registration in step S7 are completed, the operation of the in-home sensor network in this embodiment is explained to the client. Thereafter, the home 2 is handed over to the client (step S9), and the building of the in-home sensor network is completed.

[0042]

Processing of the operation checks and the initial registration in step S7 in Fig. 3 will be described specifically. Processing of the operation checks and the initial registration is processing of the check tool program stored in the HDD 64 of the terminal 51, and is controlled by the CPU 61 of the terminal 51.

When an icon of the check tool program not shown is clicked on the screen of the terminal 51, the CPU 61 of the

terminal 51 starts up the check tool program, and displays a TOP screen 100 in Fig. 4 that displays a Wireless Connection button 101 for wireless connection and disconnection between the terminal 51 and the router 13, an Device Connection Check button 102, and a Wireless Connection Release button 103.

[0043]

When the Wireless Connection button 101 is clicked on the TOP screen 100, the terminal 51 searches for wirelessly connectable routers, and acquires the names and IP addresses of extracted routers. A router connection screen 110 is displayed with the acquired names of the routers listed on a router list 111.

The router connection screen 110 is a screen for listing the connectable routers extracted at the terminal 51 for connection to the router 13, and includes the connectable router list 111, a router image display box 112 in which an image of a router selected on the router list 111 is displayed, a password entry field 113 for connection to a router, a Connect button 114 for connection to a router, and a Stop button 115 for stopping connection to a router.

[0044]

When one of the router names is clicked on the router list 111, with the IP address of the router name as a key, a customer router registration table in a management server not shown of the home builder is searched. When there is a hit for the IP address, data with a router image name

associated with the IP address in the customer router registration table is acquired from a customer router image storage section, and the router image is displayed in the router image display box 112.

When the router image is displayed in the router image display box 112, the person in charge can see that the router selected on the router list 111 is the router 13 installed in the home 2 of one of the clients of the home builder. Further, he or she can compare the router image with a picture or an actual appearance of the router 13 installed in the home 2, and advance the processing of connection to the router when they correspond.

[0045]

When the Stop button 115 is clicked, the terminal 51 displays a confirmation screen not shown that displays a message "Connection to the router will be stopped. OK?," a "Yes" button to execute a stop, and a "No" button to return to the router connection screen 110.

When the "Yes" button is clicked, the router connection screen 110 is closed, and the processing is terminated. When the "No" button is clicked, it returns to the router connection screen 110.

[0046]

When the Connect button 114 is clicked on the router connection screen 110, it is checked whether a password entered in the password field 113 agrees with the password of the router 13 registered in the customer router registration table. When it does not, an error screen

displaying a message "Password is wrong. Enter again" and a password entry field is displayed.

When the password entered in the password field 113 agrees with the password of the router 13 registered in the customer router registration table, the terminal 51 is connected to the router 13. When the connection has succeeded, the processing is terminated.

When the connection of the terminal 51 to the router 13 has failed, an error screen 120 is displayed, and the processing is terminated.

[0047]

When the terminal 51 is connected to the router 13, the person in charge performs checks of connections to the home server 10 and each sensor.

When the Device Connection Check button 102 on the TOP screen 100 is clicked, the terminal 51 starts processing of the flowchart in Fig. 5. The processing in Fig. 5 is controlled by the CPU 61 of the terminal 51.

In step S11, an IP address of the terminal 51 is acquired. In step S12, it is determined whether the acquisition of the IP address has succeeded. When it has not succeeded (step S12: No), in step S14, "Failed" is displayed in an IP address display field of the terminal 51 on a confirmation screen 130 in Fig. 6. The processing proceeds from A in Fig. 5 through A in Fig. 7 to step S24, in which it is determined whether there is "Failed" on the confirmation screen 130 in Fig. 6.

When the acquisition of the IP address has succeeded

(step S12: Yes), in step S13, the IP address of the terminal 51 is displayed on the confirmation screen 130 in Fig. 6.

[0048]

Next, in step S15, an IP address is acquired from the router 13. In step S16, it is determined whether the acquisition of the IP address has succeeded. When it has not succeeded (step S16: No), in step S17, "Failed" is displayed on an IP address display field of the router 13 on the confirmation screen 130 in Fig. 6. The processing proceeds from A in Fig. 5 through A in Fig. 7 to step S24, in which it is determined whether there is "Failed" on the confirmation screen 130 in Fig. 6.

When the acquisition of the IP address has succeeded (step S16: Yes), in step S18, the IP address of the router 13 is displayed on the confirmation screen 130 in Fig. 6.

[0049]

Next, in step S19, an IP address is acquired from the home server 10. In step S20, it is determined whether the acquisition of the IP address has succeeded. When it has succeeded (step S20: Yes), in step S21, information on the start-up status of the HEMS and the soft version of the HEMS stored in the home server 10 is acquired from the home server 10. In step S22, it is displayed on the confirmation screen 130 in Fig. 6 together with the address of the home server 10. The processing proceeds from A in Fig. 5 through A in Fig. 7 to step S24, in which it is determined whether there is "Failed" on the confirmation

screen 130 in Fig. 6.

When the acquisition of the IP address has not succeeded (step S20: No), in step S23, "Failed" is displayed in an IP address display field of the home server 10 on the confirmation screen 130 in Fig. 6. The processing proceeds from A in Fig. 5 through A in Fig. 7 to step S24, in which it is determined whether there is "Failed" on the confirmation screen 130 in Fig. 6.

[0050]

When there is "Failed" (step S24: Yes), in step S25, an error screen 140 is displayed, and the processing is terminated.

When there is no "Failed" on the confirmation screen 130 in Fig. 6 (step S24: No), in step S26, with the IP address of the router 13 as a key, the connection and operation check result table in the HDD 64 of the terminal 51 is referred to, and the check completion status of the sensors, the air conditioners, and the storage battery 43 is acquired.

Next, in step S27, using the check completion status of the sensors, the air conditioners, and the storage battery 43 acquired in step S26, a Connected Device Check Screen 150 in Fig. 8 is displayed.

The Connected Device Check Screen 150 is a screen that indicates whether the connection and operation checks of the sensors, the air conditioners, and the storage battery 43 have been completed, and displays buttons 151 to 153 for starting a connection and operation check of each connected

device when the checks have not been completed, and includes the operation check buttons 151 to 153 for the sensors, the air conditioners, and the storage battery 43, check status display boxes 154 to 156 displaying whether the operation checks of the sensors, the air conditioners, and the storage battery 43 have been completed or not, a button 157 for stopping the connection and operation check processing, and a confirmation button 158 for confirming completion, which is activated when the connection and operation checks of the connected devices have been completed.

[0051]

Next, in step S28, it is determined whether the operation check button 151 for the sensors has been clicked.

When it has been clicked (step S28: Yes), in step S29, it is determined whether there is an error in communication with any of the sensors.

When there is an error in communication with any of the sensors (step S29: Yes), an error screen 160 is displayed in step S30, and in step S31, it is determined whether the Stop button 157 has been clicked.

When it has been clicked (step S31: Yes), in step S32, a Connection Release Confirmation Screen 104 is displayed, and on condition that an End button 105 has been clicked, information on the results of the connection and operation checks having been executed up until that point in time is stored in a file, which is saved under a file name containing the identification number unique to the home 2

and the symbol indicating sensors, in the check result folder in the HDD 64 of the terminal 51, and the processing is terminated.

[0052]

When the Stop button 157 is not clicked (step S31: No), in step S31, it is determined whether the Stop button 157 has been clicked. That is, when the error screen 160 is displayed in step S30, step S31 is repeated until the Stop button 157 is clicked.

When there is no error in communication with any of the sensors (step S29: No), that is, when there is no problem in communication with all the sensors, in step S33, a sensor data entry screen 170 in Fig. 9 is displayed.

The sensor data entry screen 170 in Fig. 9 displays a branch sensor number selection field 171, a sensor presence or absence display field 172 that automatically displays information on the presence or absence of the generated power amount sensor 11c, the generated power amount sensor 11d, the gas pulse sensor 11e, and the water pulse sensor 11f recorded in advance in step S6 in Fig. 3, a flow rate display field 173 that displays the flow rates per pulse of the gas pulse sensor 11e and the water pulse sensor 11f by default, and allows the person in charge to enter them, and a "Next" button 174 for executing a communication check of each sensor.

[0053]

In step S34, it is determined whether the "Next" button 174 has been clicked. When it has not been clicked

(step S34: No), in step S34, it is determined whether the "Next" button 174 has been clicked. That is, step S34 is repeated until the "Next" button 174 is clicked.

When the "Next" button 174 is clicked (step S34: Yes), in step S35, it is determined whether there is an omission of entry on the sensor data entry screen 170. When there is an omission of entry (step S35: Yes), an error screen 181 is displayed in step S36, and in step S34, it is determined whether the "Next" button 174 has been clicked.

When there is no omission of entry on the sensor data entry screen 170 (step S35: No), in step S37, it is determined whether there is an error in communication with the sensors. In the determination in step S37, since the initial registration of the branch sensors 11a, the power measurement taps 11b, the generated power amount sensor 11c, the generated power amount sensor 11d, the gas pulse sensor 11e, and the water pulse sensor 11f in the data logger 11g has already been performed in step S6, it is determined whether communication with the data logger 11g is normal. When there is a communication error (step S37: Yes), in step S38, an error screen 182 is displayed, and in step S34, it is determined whether the "Next" button 174 has been clicked.

[0054]

When there is no error in communication with the sensors in step S37 (step S37: No), in step S39, operation checks and registration of the installation locations of the sensors are performed.

In this step, first, the branch sensors 11a installed on the distribution board 30 are sequentially connected for operation checks, and the results are displayed on a Branch Sensor List screen 190 in Fig. 10. The installation location of the connection destination of the branch circuit 32 associated with each branch sensor 11a is entered manually by the person in charge on the Branch Sensor List screen 190. Although the installation locations are manually entered in this embodiment, the installation locations may be automatically entered from data on a working drawing of the home 2. For example, device IDs of the devices and the sensors are registered in advance in the data on the working drawing, and the data on the working drawing is searched with the device IDs of the branch sensors 11a automatically acquired as a key to acquire data on the installation locations, which are automatically entered in an installation location field.

When operation checks of all the branch sensors 11a are completed and the installation locations are registered on the Branch Sensor List screen 190, a "Next" button 191 is activated. When the "Next" button 191 is clicked, an Other Sensor List screen 200 is displayed. Operation checks are also performed on the other sensors, and the results are displayed.

Next, the processing proceeds from B in Fig. 7 through B in Fig. 11 to step S40, in which it is determined whether a problem has occurred during the operation checks and the installation location registration. When a problem has

occurred (step S40: Yes), in step S41, an error screen not shown displaying the occurrence of the problem during the operation checks and the installation location registration is displayed, and in step S42, it is determined whether a Stop button 192 or 202 has been clicked.

[0055]

When it has been clicked (step S42: Yes), in step S43, a Connection Release Confirmation Screen 104 is displayed, and on condition that the End button 105 has been clicked, data on the Branch Sensor List screen 190 and the Other Sensor List screen 200 as the results of the connection and the operation checks having been executed up until that point in time is stored in a file, which is saved under a file name containing the identification number unique to the home 2 and the symbol indicating sensors, in the check result folder in the HDD 64 of the terminal 51, and the processing is terminated.

When the Stop button 192 or 202 is not clicked (step S42: No), in step S42, it is determined whether the Stop button 192 or 202 has been clicked. That is, step S42 is repeated until the Stop button 192 or 202 is clicked.

[0056]

When no problem has occurred during the operation checks and the installation location registration on any of the branch sensors 11a and the other sensors (step S40: No), in step S44, a Complete button 201 is displayed. Next, in step S45, it is determined whether the Complete button 201 has been clicked.

When it is not clicked (step S44: No), in step S44, it is determined whether the Complete button 201 has been clicked. That is, step S44 is repeated until the Complete button 201 is clicked.

When the Complete button 201 has been clicked (step S44: Yes), in step S46, the connection and operation check completion flag of the sensors is set to 1 on a record to which the IP address of the router 13 is attached in the connection and operation check result table stored in the HDD 64 of the terminal 51, to set the sensor check status to completion. The data on the Branch Sensor List screen 190 and the Other Sensor List screen 200 as the results of the connection and operation checks is stored in a file, which is saved under a file name containing the identification number unique to the home 2 and the symbol indicating sensors, in the check result folder in the HDD 64 of the terminal 51.

[0057]

Next, in step S47, with the IP address of the router 13 as a key, the connection and operation check result table is referred to, and it is determined whether the connection and operation check completion flags have been set to "Completed" (1) on all of the sensors, the air conditioners, and the storage battery 43.

When they have not (step S47: No), the processing proceeds from C in Fig. 11 through C in Fig. 7 to step S26, in which with the IP address of the router 13 as a key, the connection and operation check result table in the HDD 64

of the terminal 51 is referred to, and the check completion status of the sensors, the air conditioners, and the storage battery 43 is acquired.

When the connection and operation check completion flags have been set to "Completed" (1) on all of the sensors, the air conditioners, and the storage battery 43 (step S47: Yes), the processing proceeds from F in Fig. 11 through F in Fig. 12 to step S48, in which, as in Fig. 13, the displays of the sensor check status display box 154, the air conditioner check status display box 155, and the storage battery check status display box 156 on the Connected Device Check Screen 150 are all set to "Completed," and at the same time, the Complete button 158 is activated.

[0058]

Next, in step S49, it is determined whether the Complete button 158 has been clicked. When it is not clicked (step S49: No), in step S50, it is determined whether the Stop button 157 has been clicked.

When it has been clicked (step S50: Yes), in step S51, the Connection Release Confirmation Screen 104 is displayed, and on condition that the End button 105 has been clicked, information on the results of the connection and operation checks having been executed up until that point in time is stored in a file, which is saved under a file name containing the identification number unique to the home 2, in the check result folder in the HDD 64 of the terminal 51, and the processing is terminated.

[0059]

When the Stop button 157 is not clicked (step S50: No), in step S49, it is determined whether the Complete button 158 has been clicked. That is, when the Complete button 158 is activated in step S48, step S49 and step S50 are repeated until the Complete button 158 or the Stop button 157 is clicked.

When the Complete button 158 has been clicked (step S49: Yes), in step S52, an operation check result screen 210 is displayed.

[0060]

The operation check result screen 210 includes a communication check result list 211 showing the names of the sensors, the air conditioners, and the storage battery 43, and their installation locations and communication check results, a Recheck button 212 for executing communication check again when the communication check result list 211 includes one whose communication check result is "Failed," and a Save button 213 that is activated when the communication check result list 211 does not include one whose communication check result is "Failed."

In step S52, files contained in the check result folder in the HDD 64 of the terminal 51 are searched with the identification number unique to the home 2 as a key, and a file showing the results of the connection and operation checks executed in the home 2 is extracted. It is determined whether the file contains one whose communication check result is "Failed." When it is

contained, the Recheck button 212 is activated. When it is not contained, the Save button 213 is activated, and the operation check result screen 210 in Fig. 13 is displayed.

[0061]

Next, in step S53, it is determined whether the Save button 213 has been clicked. When it has been clicked (step S53: Yes), in step S54, the content of the communication check result list 211 is saved under a file name containing the identification number unique to the home 2, as the connected device list file 214 in the connected device list folder in the HDD 64 of the terminal 51, and the processing is terminated.

When the Save button 213 is not clicked (step S53: No), in step S55, it is determined whether the Recheck button 212 has been clicked. When it is not clicked (step S55: No), in step S53, it is determined whether the Save button 213 has been clicked. That is, step S53 and step S55 are repeated until the Recheck button 212 or the Save button 213 is clicked.

[0062]

When the Recheck button 212 has been clicked (step S55: Yes), the processing proceeds from C in Fig. 12 through C in Fig. 7 to step S26, in which, with the IP address of the router 13 as a key, the connection and operation check result table in the HDD 64 of the terminal 51 is referred to, and the check completion status of the sensors, the air conditioners, and the storage battery 43 is acquired.

[0063]

When the operation check button 151 for the sensors has not been clicked in step S28 in Fig. 7 (step S28: No), the processing proceeds from D in Fig. 7 through D in Fig. 14 to step S56, in which it is determined whether the operation check button 152 for the air conditioners has been clicked. When it has been clicked (step S56: Yes), all air conditioners connected to the home network 21 are detected. In step 57, an Air Conditioner List screen 230 in Fig. 15 in which the detected air conditioners are listed is displayed. In step S57, among display items on the air conditioner list 231 on the Air Conditioner List screen 230, items other than settings of installation locations, presence or absence of dehumidifying function, and energy-saving air conditioning function are automatically displayed.

The installation locations, the presence or absence of dehumidifying function, the energy-saving air conditioning function are entered manually by the person in charge. Although these items are entered manually in this embodiment, they may be automatically entered from the data on the working drawing of the home 2. For example, the device IDs of the devices and the sensors are registered in advance in the data on the working drawing, the data on the working drawing is searched with the device IDs of the air conditioners automatically acquired as a key, and data on the installation locations, the presence or absence of dehumidifying function, and the energy-saving air

conditioning function is acquired to be automatically entered in these fields.

[0064]

Next, in step S58, it is determined whether a problem has occurred during the operation checks and the installation location registration. When a problem has occurred during the operation checks and the installation location registration (step S58: Yes), it is considered that the connection and operation checks of the air conditioners cannot be completed. In step S59, it is determined whether a Stop button 232 has been clicked. When it has not been clicked (step S59: No), it is determined again whether the Stop button 232 has been clicked in step S59. That is, step S59 is repeated until the Stop button 232 is clicked.

When the Stop button 232 has been clicked (step S59: Yes), in step S60, the Connection Release Confirmation Screen 104 is displayed, and on condition that the End button 105 has been clicked, data on the air conditioner list 231 as information on the results of the connection and operation checks having been executed up until that point in time is stored in a file, which is saved under a file name containing the identification number unique to the home 2, in the check result folder in the HDD 64 of the terminal 51, and the processing is terminated.

[0065]

When no problem has occurred during the operation checks and the installation location registration (step

S58: No), it is considered that the operation checks on all the air conditioners have been completed. In step S61, a Complete button 233 is activated.

Next, in step S62, it is determined whether the Complete button 233 has been clicked. When it has not been clicked (step S62: No), it is determined again whether the Complete button 233 has been clicked in step S62. That is, step S62 is repeated until the Complete button 233 is clicked.

When the Complete button 233 is clicked (step S62: Yes), in step S63, the air conditioner connection and operation check completion flag is set to 1 on a record to which the IP address of the router 13 is attached in the connection and operation check result table stored in the HDD 64 of the terminal 51, to set the air conditioner check status to completion. The data on the air conditioner list 231 as the results of the connection and operation checks is stored in a file, which is saved under a file name containing the identification number unique to the home 2, in the check result folder in the HDD 64 of the terminal 51.

[0066]

Next, in step S64, with the IP address of the router 13 as a key, the connection and operation check result table is referred to, and it is determined whether the connection and operation check completion flags have been set to "Completed" (1) on all of the sensors, the air conditioners, and the storage battery 43. When they have not (step S64: No), the processing proceeds from C in Fig.

14 through C in Fig. 7 to step S26, in which, with the IP address of the router 13 as a key, the connection and operation check result table in the HDD 64 of the terminal 51 is referred to, and the check completion status of the sensors, the air conditioners, and the storage battery 43 is acquired.

When the connection and operation check completion flags have been set to "Completed" (1) on all of the sensors, the air conditioners, and the storage battery 43 (step 64: Yes), the processing proceeds from F in Fig. 14 through F in Fig. 12 to step S48, in which, as in Fig. 13, the displays of the sensor check status display box 154, the air conditioner check status display box 155, and the storage battery check status display box 156 on the Connected Device Check Screen 150 are all set to "Completed," and at the same time, the Complete button 158 is activated.

[0067]

When the operation check button 152 for the air conditioners in Fig. 15 has not been clicked in step S56 in Fig. 14 (step S56: No), the processing proceeds from E in Fig. 14 through E in Fig. 16 to step S65, in which it is determined whether the operation check button 153 for the storage battery 43 on the Connected Device Check Screen 150 has been clicked.

When it has been clicked (step S65: Yes), the storage battery 43 connected to the home network 21 is detected, and in step S66, a Storage Battery List screen 250 in Fig.

18 listing the detected storage battery 43 is displayed. In step S66, among display items in the storage battery list 251 on the Storage Battery List screen 250, items other than installation locations and names are automatically displayed.

The installation locations and the names are entered manually by the person in charge. Although these items are entered manually in this embodiment, they may be automatically entered from the data on the working drawing of the home 2. For example, the device IDs of the devices and the sensors are registered in advance in the data on the working drawing, the data on the working drawing is searched with the device IDs of the devices and the sensors automatically acquired as a key, and data on the installation locations and the names is acquired to be automatically entered in these fields.

[0068]

Next, in step S67, it is determined whether a problem has occurred during the operation checks and the installation location registration. When no problem has occurred during the operation checks and the installation location registration (step S67: No), it is considered that the operation check on the storage battery 43 has all been completed. In step S72, a Complete button 233 is activated.

When a problem has occurred during the operation checks and the installation location registration (step S67: Yes), the processing proceeds from I in Fig. 16 through I in Fig 17 to step S68, in which an error screen

260 is displayed. Next, in step S69, it is determined whether a Stop button 252 has been clicked.

When it has been clicked (step S69: Yes), in step S70, the Connection Release Confirmation Screen 104 is displayed, and on condition that the End button 105 has been clicked, data on the storage battery list 251 as information on the results of the connection and operation checks having been executed up until that point in time is stored in a file, which is saved under a file name containing the identification number unique to the home 2, in the check result folder in the HDD 64 of the terminal 51, and the processing is terminated.

[0069]

When the Stop button 252 has not been clicked (step S69: No), in step S71, it is determined whether there is a problem during the operation checks and the installation location registration. When there is (step S71: Yes), it is considered that the problem has not been recovered. In step S69, it is determined whether the Stop button 232 has been clicked. That is, step S69 and step S71 are repeated until the Stop button 252 is clicked or the problem is recovered.

[0070]

When there is no problem during the operation checks and the installation location registration (step S71: No), it is considered that the problem has been recovered. The processing proceeds from J in Fig. 17 through J in Fig. 16 to step S72, in which the Complete button 253 is activated.

Next, in step S73, it is determined whether the Complete button 253 has been clicked. When it has not been clicked (step S73: No), it is determined again whether the Complete button 253 has been clicked in step S73. That is, step S73 is repeated until the Complete button 253 is clicked.

When the Complete button 253 has been clicked (step S73: Yes), in step S74, the connection and operation check completion flag of the storage battery 43 is set to 1 on a record to which the IP address of the router 13 is attached in the connection and operation check result table stored in the HDD 64 of the terminal 51, to set the check status of the storage battery 43 to completion. The data on the storage battery list 251 as the results of the connection and operation checks is stored in a file, which is saved under a file name containing the identification number unique to the home 2, in the check result folder in the HDD 64 of the terminal 51.

[0071]

Next, in step S74, with the IP address of the router 13 as a key, the connection and operation check result table is referred to, and it is determined whether the connection and operation check completion flags have been set to "Completed" (1) on all of the sensors, the air conditioners, and the storage battery 43.

When they have not (step S75: No), the processing proceeds from C in Fig. 16 through C in Fig. 7 to step S26, in which, with the IP address of the router 13 as a key,

the connection and operation check result table in the HDD 64 of the terminal 51 is referred to, and the check completion status of the sensors, the air conditioners, and the storage battery 43 is acquired.

When the connection and operation check completion flags have been set to "Completed" (1) on all of the sensors, the air conditioners, and the storage battery 43 (step 75: Yes), the processing proceeds from F in Fig. 16 through F in Fig. 12 to step S48, in which, as in Fig. 13, the displays of the sensor check status display box 154, the air conditioner check status display box 155, and the storage battery check status display box 156 on the Connected Device Check Screen 150 are all set to "Completed," and at the same time, the Complete button 158 is activated.

[0072]

When the operation check button 153 for the storage battery 43 has not been clicked in step S65 in Fig. 16 (step S65: No), in step S76, it is determined whether the Stop button 157 has been clicked. When it has been clicked (step S76: Yes), in step S77, the Connection Release Confirmation Screen 104 is displayed, and on condition that the End button 105 has been clicked, information on the results of the connection and operation checks having been executed up until that point in time is stored in a file, which is saved under a file name containing the identification number unique to the home 2, in the check result folder in the HDD 64 of the terminal 51, and the

processing is terminated.

When the Stop button 157 has not been clicked (step S76: No), in step S78, it is determined whether the Complete button has been clicked. When it has not been clicked (step S78: No), the processing proceeds from H in Fig. 16 through H in Fig. 7 to step S28, in which it is determined whether the sensor button 151 has been clicked.

When the Complete button has been clicked (step S78: Yes), the processing proceeds from G in Fig. 16 through G in Fig. 12 to step S52, in which the operation check result screen 210 is displayed.

[0073]

In any timing after the Wireless Connection button 101 on the TOP screen 100 is clicked, after the processing for connection to the router 13 and the Device Connection Check button 102 is clicked, or during the processing of checking connections to the sensors, the air conditioners, and the storage battery 43 is performed, the Wireless Connection Release button 103 on the TOP screen 100 can be clicked to release connection through the Connection Release Confirmation Screen 104.

When the Wireless Connection Release button 103 is clicked, the terminal 51 displays the Connection Release Confirmation Screen 104 displaying a radio-frequency ID in connection.

It is determined whether a Cancel button 106 has been clicked. When the Cancel button 106 has been clicked, the Connection Release Confirmation Screen 104 is closed.

When the Cancel button 106 is not clicked, it is determined whether the End button 105 has been clicked. When the End button 105 has been clicked, it is determined whether the radio-frequency ID in connection agrees with a company radio-frequency ID commonly used in the workplace of the person in charge. When it does not, the wireless connection is released, and the processing is terminated.

When the radio-frequency ID agrees with the company radio-frequency ID commonly used in the workplace of the person in charge, a warning screen "The ID of the wireless connection being released from connection agrees with the company radio-frequency ID. The connection release will be stopped." is displayed, and the processing is terminated.

[0074]

In step S54 in Fig. 12, the connected device list file 214 saved in the connected device list folder in the HDD 64 of the terminal 51 is automatically registered in a storage section not shown of the home server 10, and used for building the HEMS. Further, the connected device list file 214 is saved from the terminal 51 in the customer data folder of the management server not shown of the home builder, and managed as history information on the home 2.

Reference Numerals

[0075]

- 1 Internet
- 2 home
- 10 home server

11a branch sensor
11b power measurement tap
11c, 11d generated power amount sensor
11e gas pulse sensor
11f water pulse sensor
11g data logger
12 display
13 router
21 home network
23 electrical device
30 distribution board
31 main circuit
32 branch circuit
41 photovoltaic power generation apparatus
42 fuel cell
43 storage battery
51 terminal computer

CLAIMS

1. An interior sensor network building device for building a network between a device, a sensor for measuring the amount of energy, and a server, which are installed in a building, the device comprising:

a section for attempting automatic connection to a router and the server;

a section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to the router or the sever has failed;

a section for attempting automatic connection to the device and the sensor via the router and the server when the connection to the router and the server has succeeded;

a section for displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to any of the device and the sensor has failed;

a section for displaying the operation check status and installation locations in the building of the device and the sensor connected successfully; and

a section for registering information on the result of the automatic connection attempt, the operation check status, and the installation locations on the device and the sensor connected successfully, in a check result storage section.

2. The interior sensor network building device according to claim 1 being a computer of a business operator that provides the building to a user of the building.

3. The interior sensor network building device according to claim 1 or 2, further comprising:

a section for displaying a Save button for saving a list of the devices, the sensors, and the installation locations of the devices and the sensors, on condition that connection to all of the devices and the sensors to be targets of the network has succeeded; and

a section for storing an electronic file in which the list is stored under a file name containing identification information identifying the building, in a connected device list storage section when the Save button is clicked.

4. The interior sensor network building device according to any one of claims 1 to 3, wherein the sensor for measuring the amount of energy measurement is a sensor selected from a group including an electric energy meter attached to a circuit provided on a distribution board of the building, a pulse sensor for measuring the amount of water or gas used, a pulse sensor for measuring the amount of gas used, and a generated power amount sensor for measuring the amount of power generated by a power generation apparatus.

5. The interior sensor network building device according

to any one of claims 1 to 4, further comprising a section for determining whether a connection ID entered for permission of connection to the router agrees with a predetermined ID for connection to a network commonly used by the building device when release of the connection with the router is instructed, and when it agrees, stopping the release of the connection with the router.

6. The interior sensor network building device according to any one of claims 1 to 5, wherein the server comprises a protocol switching section capable of controlling the devices and the sensors by switching between communication protocols used when a control signal is transmitted to the devices and the sensors, according to communication protocols used by the devices and the sensors at transmission destinations, when the devices and the sensors include devices that communicate on communication protocols different from each other.

7. An interior sensor network building method for building a network between a device, a sensor for measuring the amount of energy, and a server, which are installed in a building, the method comprising the steps of:

attempting automatic connection to a router and the server by a computer;

displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to the router or the sever has failed;

attempting automatic connection to the device and the sensor via the router and the server when the computer has succeeded in connecting to the router and the server;

displaying a device not connected successfully and a matter considered to be the cause of a connection failure when the connection to any of the device and the sensor has failed;

displaying the operation check status and installation locations in the building of the device and the sensor connected successfully; and

registering information on the result of the automatic connection attempt, the operation check status, and the installation locations on the device and the sensor connected successfully, in a check result storage section.