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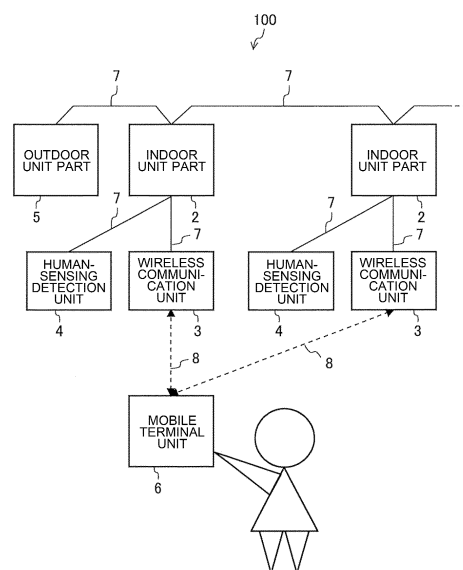
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(54) **AIR CONDITIONING SYSTEM AND APPLICATION PROGRAM**

(57) An air-conditioning system includes a plurality of indoor unit parts having wireless communication units transmitting wireless radio waves, and a mobile terminal unit performing a wireless communication with each of the wireless communication units. The mobile terminal unit includes an air-conditioning apparatus operation input unit accepting input from a user, an air-conditioning apparatus information display unit displaying information to the user, and an air-conditioning apparatus operation management unit controlling the indoor unit parts. The air-conditioning apparatus operation management unit causes the air-conditioning apparatus information display unit to display a list of the indoor unit parts and causes the air-conditioning apparatus information display unit also to perform display for urging selection of ones of the indoor unit parts as targets of a collective setting operation. When ones of the indoor unit parts are selected from the air-conditioning apparatus operation input unit, the air-conditioning apparatus operation management unit sets the selected ones of the indoor unit parts as a group.

FIG. 1



Description

Citation List

Technical Field

Patent Literature

[0001] The present disclosure relates to an air-conditioning system that conditions air by a plurality of indoor unit parts installed in a building such as an office and a shop, and an application program.

5 **[0006]** Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2003-284169

Summary of Invention

Background Art

10 Technical Problem

[0002] In many cases, in a living room in a building where a plurality of indoor unit parts are installed, a centralized controller is commonly used when the plurality of indoor unit parts are operated. In this case, an indoor floor plan is displayed on a screen on the centralized controller, and furthermore, to find out installation locations of the indoor unit parts, images of the indoor unit parts are arranged in the indoor floor plan and displayed on the screen. With this arrangement, a method is commonly performed for a user to check the user's own location on the floor plan, and operate indoor unit parts located close to the user.

[0007] However, according to Patent Literature 1, as the IDs are registered in the remote control device at the time of the initial setting, under an environment where locations of the devices corresponding to the operation targets are frequently changed, a problem is caused in that much work is required for the initial setting, and the operation targets are not to be flexibly changed.

[0003] However, through this method, it is difficult to visually check the indoor unit parts located close to the user when the indoor unit parts are concealed packages in particular. Then, even when the indoor floor plan on which the images of the indoor unit parts are arranged is displayed on the screen on the centralized controller, a problem remains in that it is difficult for the user to recognize the indoor unit parts located close to the user.

15 **[0008]** The present disclosure has been made to solve the above-described problem and is aimed at providing an air-conditioning system and an application program each configured such that ones of indoor unit parts corresponding to targets of a collective setting operation can be flexibly changed.

[0004] As a technology for solving this problem, disclosed is a technology with which a remote control device is provided that can bidirectionally exchange data signals with a plurality of devices by using radio waves, and operations of the devices under management performed by the remote control device can be easily performed by associating data including ID codes assigned to the plurality of respective devices with results of averaging process for a predetermined period of time of radio wave intensities of the data signals and by registering the associated items, at the time of initial setting (for example, see Patent Literature 1).

20 Solution to Problem

[0005] In Patent Literature 1, a plurality of devices corresponding to operation targets such as air-conditioning apparatuses have unique IDs. At the time of the initial setting, these devices notify a remote control device of the IDs, and intensities of radio waves transmitted by the devices are associated with the IDs and the associated items are registered in the remote control device. As a result, it is possible to operate only the devices corresponding to the operation targets in the vicinity of the user.

25 **[0009]** An air-conditioning system according to one embodiment of the present disclosure includes a plurality of indoor unit parts having wireless communication units configured to transmit wireless radio waves, and a mobile terminal unit configured to perform a wireless communication with each of the wireless communication units. The mobile terminal unit includes an air-conditioning apparatus operation input unit configured to accept input from a user, an air-conditioning apparatus information display unit configured to display information to the user, and an air-conditioning apparatus operation management unit configured to control the plurality of indoor unit parts. The air-conditioning apparatus operation management unit is configured to cause the air-conditioning apparatus information display unit to display a list of the plurality of indoor unit parts and is configured to cause the air-conditioning apparatus information display unit also to perform display for urging selection of ones of the plurality of indoor unit parts as targets of a collective setting operation. When ones of the plurality of indoor unit parts are selected from the air-conditioning apparatus operation input unit, the air-conditioning apparatus operation management unit is configured to set the selected ones of the plurality of indoor unit parts as a group.

30 **[0010]** In addition, an application program according to another embodiment of the present disclosure is configured to cause a computer to execute processing for causing a display unit configured to display information to a user to display a list of indoor unit parts and also to perform display for urging selection of ones of the indoor unit parts as targets of a collective setting operation.

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When ones of the indoor unit parts are selected from an input unit configured to accept input from the user, the application program is configured to cause the computer to execute processing for setting the selected ones of the indoor unit parts as a group.

Advantageous Effects of Invention

[0011] With the air-conditioning system and the application program according to an embodiment of the present disclosure, the air-conditioning apparatus operation management unit causes the air-conditioning apparatus information display unit to display the list of the indoor unit parts and also to perform the display for urging the selection of ones of the indoor unit parts as the targets of the collective setting operation. Then, when ones of the indoor unit parts are selected from the air-conditioning apparatus operation input unit, the air-conditioning apparatus operation management unit sets the selected ones of the indoor unit parts as a group. For this reason, group setting can be easily made, and ones of the indoor unit parts corresponding to the targets of the collective setting operation can be flexibly changed.

Brief Description of Drawings

[0012]

[Fig. 1] Fig. 1 is a schematic diagram illustrating a configuration of an air-conditioning system according to Embodiment 1 of the present disclosure.

[Fig. 2] Fig. 2 is a block diagram illustrating an internal processing configuration of the air-conditioning system according to Embodiment 1 of the present disclosure.

[Fig. 3] Fig. 3 is a flowchart illustrating processing for making group setting of indoor unit parts by a mobile terminal unit of the air-conditioning system according to Embodiment 1 of the present disclosure.

[Fig. 4] Fig. 4 is a diagram for describing groups of the air-conditioning system according to Embodiment 1 of the present disclosure.

[Fig. 5] Fig. 5 is a flowchart illustrating processing in a mobile terminal unit up to operation start of indoor unit parts of an air-conditioning system according to Embodiment 2 of the present disclosure.

[Fig. 6] Fig. 6 is a flowchart illustrating processing of an indoor unit part up to the operation start of the indoor unit part of the air-conditioning system according to Embodiment 2 of the present disclosure.

[Fig. 7] Fig. 7 is a flowchart illustrating processing in the mobile terminal unit up to operation stop of the indoor unit parts of the air-conditioning system according to Embodiment 2 of the present disclosure.

[Fig. 8] Fig. 8 is a flowchart illustrating processing of the indoor unit part up to the operation stop of the indoor unit part of the air-conditioning system ac-

cording to Embodiment 2 of the present disclosure. [Fig. 9] Fig. 9 is a flowchart illustrating processing in a mobile terminal unit up to operation start of indoor unit parts of an air-conditioning system according to Embodiment 3 of the present disclosure.

[Fig. 10] Fig. 10 is a flowchart illustrating processing of an indoor unit part up to the operation start of the indoor unit part of the air-conditioning system according to Embodiment 3 of the present disclosure. [Fig. 11] Fig. 11 is a flowchart illustrating processing of an indoor unit part up to operation start of the indoor unit part of an air-conditioning system according to Embodiment 4 of the present disclosure.

[Fig. 12] Fig. 12 is a flowchart illustrating processing in a mobile terminal unit up to operation start of indoor unit parts of an air-conditioning system according to Embodiment 5 of the present disclosure.

[Fig. 13] Fig. 13 is a flowchart illustrating processing of an indoor unit part up to the operation start of the indoor unit part of the air-conditioning system according to Embodiment 5 of the present disclosure.

[Fig. 14] Fig. 14 is a flowchart illustrating processing in a mobile terminal unit up to operation start of indoor unit parts of an air-conditioning system according to Embodiment 6 of the present disclosure.

[Fig. 15] Fig. 15 is a diagram for describing processing for excluding, from operation targets, the indoor unit part having a nonadjacent address of the air-conditioning system according to Embodiment 6 of the present disclosure. Description of Embodiments

[0013] Hereinafter, embodiments of the present disclosure will be described with reference to the drawings. It is noted that the present disclosure is not limited by the embodiments described below. In addition, relationships of sizes between components in the following drawings may differ from actual relationships.

Embodiment 1

[0014] Fig. 1 is a schematic diagram illustrating a configuration of an air-conditioning system 100 according to Embodiment 1 of the present disclosure.

[0015] First, the configuration of the air-conditioning system 100 according to present Embodiment 1 will be described.

[0016] The air-conditioning system 100 includes a plurality of indoor unit parts 2 configured to condition air in air-conditioned spaces, an outdoor unit part 5 forming, together with the indoor unit parts 2, a refrigerant circuit, and a mobile terminal unit 6 configured to communicate with the indoor unit parts 2. In addition, each of the indoor unit parts 2 is provided with a wireless communication unit 3 configured to transmit a wireless radio wave, and a human-sensing detection unit 4 configured to detect a person.

[0017] The indoor unit parts 2 and the outdoor unit part 5 form the refrigerant circuit in which refrigerant circu-

lates, and are connected to each other by a wired communication line section 7 for each of refrigerant systems. It is noted that in one refrigerant system, the indoor unit part 2 may also include a plurality of indoor unit parts 2, and the outdoor unit part 5 may also include a plurality of outdoor unit parts 5. In addition, each of the indoor unit parts 2 and the outdoor unit part 5 can bidirectionally communicate with each other via the wired communication line section 7.

[0018] The wireless communication unit 3 and the human-sensing detection unit 4 are connected to the corresponding indoor unit part 2 by the wired communication line section 7 through which communications can be performed bidirectionally. According to present Embodiment 1, a configuration is adopted where one wireless communication unit 3 is connected to one indoor unit part 2 but is not limited to this case, and for example, a configuration may also be adopted where one wireless communication unit 3 is connected to two indoor unit parts 2. In other words, one wireless communication unit 3 may be a shared unit by the plurality of indoor unit parts 2.

[0019] The wired communication line section 7 is configured by a widely used communication standard such as Ethernet (registered trademark) and a two-wire universal asynchronous receiver transmitter (UART), or a unique communication standard.

[0020] It is noted that the wireless communication unit 3 and the human-sensing detection unit 4 may have a structure independent from the indoor unit part 2, or may also have a structure built inside the indoor unit part 2. When the wireless communication unit 3 and the human-sensing detection unit 4 have the structure built inside the indoor unit part 2, the wired communication line section 7 can be configured by a widely used communication standard such as an inter-integrated circuit (I2C).

[0021] The wireless communication unit 3 can bidirectionally communicate with the mobile terminal unit 6 via a wireless communication line section 8. It is noted that the wireless communication line section 8 is configured by a widely used communication standard such as Wi-Fi (registered trademark), Bluetooth (registered trademark), and ZigBee (registered trademark).

[0022] The human-sensing detection unit 4 is configured to detect a person in the vicinity of the indoor unit part 2, in other words, a person at a certain distance from the indoor unit part 2, and is a thermal viewer, a camera, a human-sensing sensor, or other device. Herein, the certain distance from the indoor unit part 2 is a distance within the air-conditioned space assigned to the indoor unit part 2. It is noted that the air-conditioning system 100 according to present Embodiment 1 may also have a configuration excluding the human-sensing detection unit 4.

[0023] When a main body of the indoor unit part 2 or the indoor unit part 2 is a concealed package, the wireless communication unit 3 and the human-sensing detection unit 4 are disposed close to an air outlet of the concealed package, close to an air inlet of the concealed package,

or at a duct. It is noted that the wireless communication unit 3 and the human-sensing detection unit 4 may be built in the indoor unit part 2 or may also be separate units attached to the indoor unit part 2.

[0024] The mobile terminal unit 6 is, for example, a commercially available smart phone or tablet PC, or other device, and may have any configuration as long as the mobile terminal unit 6 can wirelessly communicate with the wireless communication unit 3. An application program for operating the air-conditioning system 100 is installed in this mobile terminal unit 6.

[0025] Fig. 2 is a block diagram illustrating an internal processing configuration of the air-conditioning system 100 according to Embodiment 1 of the present disclosure.

[0026] Next, the internal processing configuration of the air-conditioning system 100 according to present Embodiment 1 will be described.

[0027] The indoor unit part 2 includes an indoor unit control unit 11. The indoor unit control unit 11 is configured to execute control of the indoor unit part 2 for executing an air-conditioning operation in cooperation with the outdoor unit part 5 and other indoor unit part 2 that are connected by the wired communication line section 7 in the same refrigerant system.

[0028] The wireless communication unit 3 includes a wireless ID unit 12 and a wireless transmission and reception unit 13. The wireless communication unit 3 includes a control circuit including an MCU, RAM, ROM, or other device configured to control the wireless ID unit 12 and the wireless transmission and reception unit 13.

[0029] The wireless ID unit 12 is configured to record an ID uniquely assigned to the wireless communication unit 3, and is a ROM or other device included in the wireless communication unit 3. In addition, a BD address, a MAC address, and other address can be used as the ID.

[0030] The wireless transmission and reception unit 13 is configured to execute transmission and reception of the wireless communication line section 8, and is a digital signal processing circuit, an analog signal processing circuit, an antenna circuit, or other circuit.

[0031] The outdoor unit part 5 includes an outdoor unit control unit 14. The outdoor unit control unit 14 is configured to execute control of the outdoor unit part 5 for executing an air-conditioning operation in cooperation with the indoor unit part 2 and other outdoor unit part 5 that are connected by the wired communication line section 7 in the same refrigerant system.

[0032] The mobile terminal unit 6 includes a mobile terminal side wireless communication unit 9, an air-conditioning apparatus operation management unit 15, an air-conditioning apparatus operation input unit 16, and an air-conditioning apparatus information display unit 17. In addition, an application program for executing processing for detecting a wireless radio wave transmitted by the wireless transmission and reception unit 13, processing for transmitting an air-conditioning operation command, which will be described below, to the wireless

transmission and reception unit 13, and other processing is installed in the mobile terminal unit 6. Herein, the application program installed in the mobile terminal unit 6 is stored in the air-conditioning apparatus operation management unit 15, but may alternatively be stored in a storage unit other than the air-conditioning apparatus operation management unit 15.

[0033] The mobile terminal side wireless communication unit 9 has a function similar to that of the wireless communication unit 3 provided to the indoor unit part 2, and the function can be implemented by using a function originally included in the mobile terminal unit 6.

[0034] The air-conditioning apparatus operation management unit 15 is configured to control a setting operation such as starting of operation, stopping of the operation, and temperature setting for the indoor unit part 2, and control the wireless communication unit 3 provided to the indoor unit part 2 by the application program. In addition, the air-conditioning apparatus operation management unit 15 is configured to measure a radio wave intensity of a received wireless radio wave, for example, a received signal strength indication (RSSI) by the application program. Furthermore, the air-conditioning apparatus operation management unit 15 is configured to record a wireless ID of the wireless communication unit 3 provided to the indoor unit part 2 by the application program, and the function of recording the wireless ID can be implemented by an MCU, RAM, ROM, a flash memory, or other device.

[0035] In addition, when the air-conditioning apparatus operation management unit 15 determines that the mobile terminal unit 6 receives a wireless radio wave from the wireless communication unit 3 provided to the indoor unit part 2 and the indoor unit part 2 is located close to the mobile terminal unit 6, the wireless ID is recorded. Herein, the radio wave intensity of the wireless radio wave is associated with a distance, and it can be determined that the indoor unit part 2 provided with the wireless communication unit 3 that transmits a wireless radio wave having a higher radio wave intensity is located closer to the mobile terminal unit 6. The air-conditioning apparatus operation management unit 15 thus determines whether or not the indoor unit part 2 is located close to the mobile terminal unit 6 on the basis of the radio wave intensity of the wireless radio wave received from the wireless communication unit 3 provided to the indoor unit part 2. It is noted that the air-conditioning apparatus operation management unit 15 determines that the indoor unit part 2 is no longer close to the mobile terminal unit 6 when the mobile terminal unit 6 does not receive the wireless radio wave for a certain period of time from the wireless communication unit 3 of the indoor unit part 2, and deletes the stored wireless ID.

[0036] The air-conditioning apparatus operation input unit 16 is configured to accept input of the setting operation such as the starting of the operation, the stopping of the operation, and the temperature setting for the indoor unit part 2 by a user from the mobile terminal unit

6, and is formed by a button, a touch screen, and other parts included in the mobile terminal unit 6.

[0037] The air-conditioning apparatus operation input unit 16 can obtain the setting operation such as the starting of the operation, the stopping of the operation, and the temperature setting by the application program executed on the mobile terminal unit 6. In addition, the mobile terminal side wireless communication unit 9 can communicate with the wireless communication unit 3 provided to the indoor unit part 2 by the application program executed on the mobile terminal unit 6.

[0038] The air-conditioning apparatus information display unit 17 is configured to display necessary information when the user inputs the setting operation such as the starting of the operation, the stopping of the operation, and the temperature setting for the indoor unit part 2 from the mobile terminal unit 6, and is formed by a touch screen or other part included in the mobile terminal unit 6. It is noted that the air-conditioning apparatus operation input unit 16 and the air-conditioning apparatus information display unit 17 may have structures separate from each other, or may also have an integrated structure.

[0039] In addition, wireless radio signals transmitted and received by the wireless communication unit 3 and the mobile terminal side wireless communication unit 9 include wireless ID information of transmission sources, address information of the transmission sources, operation command information for the indoor unit part 2, and other information.

[0040] The air-conditioning system 100 according to present Embodiment 1 performs grouping on the basis of radio wave intensities of the wireless communication units 3 provided to the respective indoor unit parts 2, in other words, causes the user to manually select ones of the indoor unit parts 2 to be set as a group, and sets the selected ones of the selected indoor unit parts 2 as a group. It is noted that this grouping also includes a case where a set of ones of the indoor unit parts 2 corresponding to targets of a collective setting operation is set only once, in other words, a case where the group that has been set once is subsequently subjected to cancellation of the group setting.

[0041] Fig. 3 is a flowchart illustrating processing for making group setting of the indoor unit parts 2 by the mobile terminal unit 6 of the air-conditioning system 100 according to Embodiment 1 of the present disclosure. Fig. 4 is a diagram for describing groups of the air-conditioning system 100 according to Embodiment 1 of the present disclosure.

[0042] Hereinafter, processing for making the group setting of the indoor unit parts 2 by the mobile terminal unit 6 of the air-conditioning system 100 according to present Embodiment 1 will be described with reference to Fig. 3 and Fig. 4.

(Step S501)

[0043] When the air-conditioning apparatus operation

management unit 15 accepts input of a user ID from the air-conditioning apparatus operation input unit 16, the air-conditioning apparatus operation management unit 15 determines whether or not a user is an administrator with reference to information related to user IDs. It is noted that the information related to the user IDs is stored in the air-conditioning apparatus operation management unit 15. When the air-conditioning apparatus operation management unit 15 determines that the user is the administrator (YES), this process proceeds to the processing in step S502. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the user is not the administrator (NO), the process proceeds to the processing in step S507. It is noted that the information related to the user IDs may alternatively be stored in a storage unit other than the air-conditioning apparatus operation management unit 15.

(Step S502)

[0044] The air-conditioning apparatus operation management unit 15 determines whether or not a group is set in advance. Herein, the group refers to a set of ones of the indoor unit parts 2 corresponding to the targets of the collective setting operation. As illustrated in Fig. 4, for example, in a case where two indoor unit parts 2 belong to a group 1, when the group 1 is selected and operation for starting operation is performed on the group 1, an operation start command is transmitted to all of the two indoor unit parts 2 belonging to the group 1. It is noted that the air-conditioning apparatus operation management unit 15 stores group information in which a number of the group and information of wireless IDs of the wireless communication units 3 of the indoor unit parts 2 belonging to the group are associated with each other. When the air-conditioning apparatus operation management unit 15 determines that the group is set in advance (YES), the process proceeds to the processing in step S503. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the group is not set in advance (NO), the process proceeds to the processing in step S504. It is noted that the group information may alternatively be stored in a storage unit other than the air-conditioning apparatus operation management unit 15.

(Step S503)

[0045] The air-conditioning apparatus operation management unit 15 causes the air-conditioning apparatus information display unit 17 to perform display for urging the user to input on whether or not the group is reset. After the user inputs on whether or not the group is reset from the air-conditioning apparatus operation input unit 16, the air-conditioning apparatus operation management unit 15 determines whether or not the air-conditioning apparatus operation management unit 15 has accept-

ed input for resetting the group from the air-conditioning apparatus operation input unit 16. When the air-conditioning apparatus operation management unit 15 determines that the air-conditioning apparatus operation management unit 15 has accepted the input for resetting the group from the air-conditioning apparatus operation input unit 16 (YES), the process proceeds to the processing in step S504. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the air-conditioning apparatus operation management unit 15 has accepted input for avoiding group resetting from the air-conditioning apparatus operation input unit 16 (NO), the process proceeds to the processing in step S507.

(Step S504)

[0046] The air-conditioning apparatus operation management unit 15 causes the air-conditioning apparatus information display unit 17 to display a list of the indoor unit parts 2 and also perform display for urging selection of ones of the indoor unit parts 2 as targets of a collective setting operation, in other words, selection of ones of the indoor unit parts 2 desired to be set as a group.

(Step S505)

[0047] The air-conditioning apparatus operation management unit 15 determines whether or not the selection of ones of the indoor unit parts 2 desired to be set as the group is performed from the air-conditioning apparatus operation input unit 16, in other words, whether or not the air-conditioning apparatus operation management unit 15 has accepted input of group setting. When the air-conditioning apparatus operation management unit 15 determines that the air-conditioning apparatus operation management unit 15 has accepted the input of the group setting from the air-conditioning apparatus operation input unit 16 (YES), the process proceeds to the processing in step S506. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the air-conditioning apparatus operation management unit 15 has not accepted the input of the group setting from the air-conditioning apparatus operation input unit 16 (NO), the process waits until the air-conditioning apparatus operation management unit 15 accepts the input of the group setting.

(Step S506)

[0048] The air-conditioning apparatus operation management unit 15 associates the number of the group with the information of the wireless IDs of the wireless communication units 3 of the indoor unit parts 2 belonging to the group and registers the associated items in the air-conditioning apparatus operation management unit 15.

(Step S507)

[0049] The air-conditioning apparatus operation management unit 15 determines whether or not the air-conditioning apparatus operation management unit 15 has accepted input of the setting operation such as the starting of the operation, the stopping of the operation, and the temperature setting for the group or the indoor unit part 2 and selection of the group or ones of the indoor unit parts 2 as the targets of the setting operation from the air-conditioning apparatus operation input unit 16. When the air-conditioning apparatus operation management unit 15 determines that the air-conditioning apparatus operation management unit 15 has accepted the input of the setting operation and other information from the air-conditioning apparatus operation input unit 16 (YES), the process proceeds to the processing in step S508. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the air-conditioning apparatus operation management unit 15 has not accepted the input of the setting operation or other information from the air-conditioning apparatus operation input unit 16 (NO), the process waits until the air-conditioning apparatus operation management unit 15 accepts the input of the setting operation.

(Step S508)

[0050] The air-conditioning apparatus operation management unit 15 transmits the air-conditioning operation command to the wireless communication units 3 of the selected ones of the indoor unit parts 2 or all of the wireless communication units 3 of ones of the indoor unit parts 2 that have the wireless IDs registered in the selected group. Herein, the air-conditioning operation command includes an operation start command for starting an air-conditioning operation, a setting change command for changing an operation mode, a set temperature, a wind direction, a wind strength, and other settings, an operation stop command for stopping the air-conditioning operation, and other commands.

[0051] Then, the indoor unit part 2 that has received the air-conditioning operation command executes the setting operation such as the starting of the operation, the stopping of the operation, and the setting of the temperature.

[0052] As described above, the air-conditioning system 100 according to present Embodiment 1 includes the plurality of indoor unit parts 2 having the wireless communication units 3 configured to transmit the wireless radio waves, and also includes the mobile terminal unit 6 configured to wirelessly communicate with each of the wireless communication units 3. In addition, the mobile terminal unit 6 includes the air-conditioning apparatus operation input unit 16 configured to accept the input from the user, the air-conditioning apparatus information display unit 17 configured to display the information to the user, and the air-conditioning apparatus operation man-

agement unit 15 configured to control the indoor unit parts 2. In addition, the air-conditioning apparatus operation management unit 15 causes the air-conditioning apparatus information display unit 17 to display the list of the indoor unit parts 2 and also to perform the display for urging the selection of ones of the indoor unit parts 2 as the targets of the collective setting operation. Then, when ones of the indoor unit parts 2 are selected from the air-conditioning apparatus operation input unit 16, the air-conditioning apparatus operation management unit 15 is configured to set the selected ones of the indoor unit parts 2 as the group.

[0053] In addition, the application program according to present Embodiment 1 causes a computer to execute processing for causing a display unit configured to display information to the user to display the list of the indoor unit parts 2 and also to perform display for urging the selection of ones of the indoor unit parts 2 as the targets of the collective setting operation, and causes, when ones of the indoor unit parts 2 are selected from an input unit configured to accept the input from the user, the computer to execute processing for setting the selected ones of the indoor unit parts 2 as the group.

[0054] With the air-conditioning system 100 and the application program according to present Embodiment 1, the air-conditioning apparatus operation management unit 15 causes the air-conditioning apparatus information display unit 17 to display the list of the indoor unit parts 2 and also to perform the display for urging the selection of ones of the indoor unit parts 2 as the targets of the collective setting operation. Then, when ones of the indoor unit parts 2 are selected from the air-conditioning apparatus operation input unit 16, the selected ones of the indoor unit parts 2 are set as the group. For this reason, the group setting can be easily made, and ones of the indoor unit parts 2 corresponding to the targets of the collective setting operation can be flexibly changed.

Embodiment 2

[0055] Hereinafter, Embodiment 2 of the present disclosure will be described. Descriptions on components that correspond to those of Embodiment 1 will be omitted, and the same reference signs are assigned to the same components or equivalent components of Embodiment 1.

[0056] An air-conditioning system 100 according to present Embodiment 2 automatically decides ones of indoor unit parts 2 corresponding to operation targets on the basis of the radio wave intensities of wireless communication units 3 provided to the respective indoor unit parts 2.

[0057] Fig. 5 is a flowchart illustrating processing in a mobile terminal unit 6 up to operation start of the indoor unit parts 2 of the air-conditioning system 100 according to Embodiment 2 of the present disclosure.

[0058] Next, the processing in the mobile terminal unit 6 up to the operation start of the indoor unit parts 2 of the

air-conditioning system 100 according to present Embodiment 2 will be described with reference to Fig. 5.

(Step S101)

[0059] The wireless communication units 3 of the indoor unit parts 2 transmit wireless radio waves at a certain radio wave intensity. It is noted that each of the wireless communication units 3 transmits the wireless radio wave at the same radio wave intensity. In addition, each of the wireless communication units 3 transmits the wireless radio wave irrespective of a status on whether a power supply of the corresponding one of the indoor unit parts 2 is on or off. Then, when an air-conditioning apparatus operation management unit 15 accepts input for starting the operation from an air-conditioning apparatus operation input unit 16, the air-conditioning apparatus operation management unit 15 starts to detect the wireless radio waves transmitted from the wireless communication units 3 of the indoor unit parts 2 by using a mobile terminal side wireless communication unit 9. Furthermore, the air-conditioning apparatus operation management unit 15 starts to measure a period of time from the start of the detection of the wireless radio waves.

(Step S102)

[0060] The air-conditioning apparatus operation management unit 15 determines whether or not the period of time from the start of the detection of the wireless radio waves reaches a period of time for ending the detection. Herein, the period of time for ending the detection is a period of time that is previously set, and is a period of time when the air-conditioning apparatus operation management unit 15 detects the wireless radio waves. When the air-conditioning apparatus operation management unit 15 determines that the period of time from the start of the detection of the wireless radio waves reaches the period of time for ending the detection (YES), the processing for starting the operation of the indoor unit parts 2 ends. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the period of time from the start of the detection of the wireless radio waves does not reach the period of time for ending the detection (NO), the detection of the wireless radio waves continues.

(Step S103)

[0061] When the air-conditioning apparatus operation management unit 15 detects the wireless radio wave (YES), the process proceeds to the processing in step S104. On the other hand, when the air-conditioning apparatus operation management unit 15 does not detect the wireless radio wave (NO), the processing for starting the operation of the indoor unit parts 2 ends. It is noted that when the air-conditioning apparatus operation management unit 15 does not detect the wireless radio wave,

the mobile terminal unit 6 may also be notified of a result that the operation is not to be performed by a pop-up screen or other method. Alternatively, the processing for detecting the wireless radio waves may also continue until the air-conditioning apparatus operation management unit 15 accepts input for ending the operation from the air-conditioning apparatus operation input unit 16.

(Step S104)

[0062] The air-conditioning apparatus operation management unit 15 checks a wireless ID of the wireless communication unit 3 that is a transmission source of the detected wireless radio wave, and also starts measurement of radio wave intensities. Furthermore, the air-conditioning apparatus operation management unit 15 resets the measured period of time from the start of the detection of the wireless radio waves. Herein, to determine a fluctuation of a radio wave intensity, the air-conditioning apparatus operation management unit 15 uses an average or median value from results of multiple measurements, and decides the radio wave intensity of the detected wireless radio wave.

25 (Step S105)

[0063] The air-conditioning apparatus operation management unit 15 determines whether or not the radio wave intensity of the detected wireless radio wave that is decided in the processing in step S104 is higher than or equal to a reference intensity that is set in advance. Herein, the reference intensity is, for example, -70 dBm. In addition, when the radio wave intensity is detected using a level system as seen in a radio wave display of a smart phone (for example, levels 0 to 5), the reference intensity is, for example, the level 3. When the air-conditioning apparatus operation management unit 15 determines that the radio wave intensity of the detected wireless radio wave is higher than or equal to the reference intensity (YES), the process proceeds to the processing in step S107. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the radio wave intensity of the detected wireless radio wave is not higher than or equal to the reference intensity (NO), the process proceeds to the processing in step S106.

(Step S106)

50 **[0064]** The air-conditioning apparatus operation management unit 15 discards or deletes information of the wireless ID of the wireless communication unit 3 of the indoor unit part 2 having the radio wave intensity below the reference intensity.

55 **[0065]** Herein, when a plurality of wireless radio waves are detected in the processing in step S103, the air-conditioning apparatus operation management unit 15 performs the processing in steps S104 to S106 the same

number of times as the number of detected wireless radio waves.

(Step S107)

[0066] The air-conditioning apparatus operation management unit 15 associates the wireless IDs of the wireless communication units 3 of the indoor unit parts 2 that have radio wave intensities higher than or equal to the reference intensity with the information of the radio wave intensities and registers the associated items in the air-conditioning apparatus operation management unit 15.

(Step S108)

[0067] The air-conditioning apparatus operation management unit 15 transmits the operation start command to the wireless communication units 3, which is provided to the indoor unit parts 2, and that have the registered wireless IDs.

[0068] Fig. 6 is a flowchart illustrating processing of the indoor unit part 2 up to the operation start of the indoor unit part 2 of the air-conditioning system 100 according to Embodiment 2 of the present disclosure.

[0069] Next, the processing of the indoor unit part 2 up to the operation start of the indoor unit part 2 of the air-conditioning system 100 according to present Embodiment 2 will be described with reference to Fig. 6.

(Step S201)

[0070] An indoor unit control unit 11 determines whether or not the operation start command is received from the mobile terminal unit 6 by using the wireless communication unit 3. When the indoor unit control unit 11 determines that the operation start command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S202. On the other hand, when the indoor unit control unit 11 determines that the operation start command is not received from the mobile terminal unit 6 (NO), the process waits until the operation start command is detected.

(Step S202)

[0071] The indoor unit control unit 11 determines whether or not a person in the air-conditioned space assigned to the indoor unit part 2 is detected by a human-sensing detection unit 4. When the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is detected (YES), the process proceeds to the processing in step S203. On the other hand, when the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is not detected (NO), the process proceeds to the processing in step S201. Herein, a reason why it is determined whether or not the person in the air-conditioned space assigned to

the indoor unit part 2 is detected is to exclude the indoor unit part 2 to which the air-conditioned space in which no person is present is assigned from the operation targets for saving energy. It is noted that the detection of the person in the air-conditioned space assigned to the indoor unit part 2 by the human-sensing detection unit 4 may be performed before the measurement of the radio wave intensities is started.

[0072] It is noted that some indoor unit parts 2 may include no human-sensing detection unit 4. In such a case, the determination processing in step S202 may be skipped. In this case, in the determination in step S201, when the indoor unit control unit 11 determines that the operation start command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S203.

(Step S203)

[0073] The indoor unit control unit 11 starts the operation of the indoor unit part 2 and also transmits the operation start command to an outdoor unit control unit 14 by using a wired communication line section 7 to start the operation of an outdoor unit part 5. The air-conditioning operation is thus executed.

[0074] Fig. 7 is a flowchart illustrating processing in the mobile terminal unit 6 up to operation stop of the indoor unit parts 2 of the air-conditioning system 100 according to Embodiment 2 of the present disclosure.

[0075] Next, the processing in the mobile terminal unit 6 up to the operation stop of the indoor unit parts 2 that are the operation stop targets of the air-conditioning system 100 according to present Embodiment 2 will be described with reference to Fig. 7.

(Step S301)

[0076] When the air-conditioning apparatus operation management unit 15 accepts input of the operation stop from the air-conditioning apparatus operation input unit 16, the air-conditioning apparatus operation management unit 15 reads out the wireless ID registered in the air-conditioning apparatus operation management unit 15.

(Step S302)

[0077] The air-conditioning apparatus operation management unit 15 transmits the operation stop command to the wireless communication unit 3 of the indoor unit part 2 that has the read-out wireless ID from the mobile terminal side wireless communication unit 9.

[0078] It is noted that the operation for changing the setting such as the temperature setting of the indoor unit part 2 can also be executed by the processing similar to that of the flow chart illustrated in Fig. 7. In this case, in step S302, a command transmitted from the mobile terminal side wireless communication unit 9 is a setting

change command or other command.

[0079] Fig. 8 is a flowchart illustrating processing of the indoor unit part 2 up to the operation stop of the indoor unit part 2 of the air-conditioning system 100 according to Embodiment 2 of the present disclosure.

[0080] Next, the processing up to the operation stop of ones of the indoor unit parts 2 corresponding to the operation stop targets of the air-conditioning system 100 according to present Embodiment 2 will be described with reference to Fig. 8.

(Step S401)

[0081] The indoor unit control unit 11 determines whether or not the operation stop command is received from the mobile terminal unit 6 by using the wireless communication unit 3. When the indoor unit control unit 11 determines that the operation stop command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S402. On the other hand, when the indoor unit control unit 11 determines that the operation stop command is not received from the mobile terminal unit 6 (NO), the process waits until the operation stop command is received.

(Step S402)

[0082] The indoor unit control unit 11 stops the operation of the indoor unit part 2 and also transmits the operation stop command to the outdoor unit control unit 14 by using the wired communication line section 7 to stop the operation of the outdoor unit part 5. The air-conditioning operation is thus stopped.

[0083] As described above, the air-conditioning system 100 according to present Embodiment 2 includes the plurality of indoor unit parts 2 having the wireless communication units 3 configured to transmit the wireless radio waves, and the mobile terminal unit 6 configured to wirelessly communicate with each of the wireless communication units 3. In addition, the mobile terminal unit 6 detects the wireless radio waves transmitted from the wireless communication units 3, and transmits the operation start command to the wireless communication units 3 that transmit wireless radio waves having intensities higher than or equal to a previously set reference intensity.

[0084] With the air-conditioning system 100 according to present Embodiment 2, the mobile terminal unit 6 detects the wireless radio waves transmitted from the wireless communication units 3, and transmits the operation start command to the wireless communication units 3 that transmit wireless radio waves having intensities higher than or equal to the previously set reference intensity. In other words, the radio wave intensity of the wireless radio wave is associated with the distance, and it can be determined that the indoor unit part 2 provided with the wireless communication unit 3 that transmits a wireless radio wave having a higher radio wave intensity

is located closer to the mobile terminal unit 6. For this reason, when the above-described configuration is adopted, even under an environment where locations of the indoor unit parts 2 are frequently changed, the indoor unit parts 2 located close to the user can be easily operated.

[0085] It is noted that it is difficult for the user to recognize whether or not the indoor unit part 2 is actually operated in accordance with operation input from the user. To solve this problem, the indoor unit part 2 or the mobile terminal unit 6 may also be provided with a feedback function. An exemplary method in the indoor unit part 2 includes that, in a case where a light emitting unit such as an LED is disposed in the indoor unit part 2, the user is notified that the input operation is accepted through feedback provided by turning on the light emitting unit. In addition, an exemplary method in the mobile terminal unit 6 includes that, in addition to light emission and vibration, the user is notified that which ones of the indoor unit parts 2 have accepted the input operation through feedback provided by displaying addresses of the indoor unit parts 2 that have accepted the input operation and the user is also notified of the number of the indoor unit parts 2 that have accepted the input operation as feedback.

[0086] In addition, in the air-conditioning system 100 according to present Embodiment 2, each of the indoor unit parts 2 is provided with the human-sensing detection unit 4 configured to detect a person, and the indoor unit parts 2 provided with the wireless communication units 3 that have received the operation start command are configured to start the operation of the indoor unit parts 2 when a person is detected by the corresponding human-sensing detection units 4.

[0087] With the air-conditioning system 100 according to present Embodiment 2, among the indoor unit parts 2 provided with the wireless communication units 3 that have received the operation start command, only the indoor unit parts 2 provided with the human-sensing detection units 4 that detect a person start the operation of the indoor unit parts 2. For this reason, the indoor unit part 2 to which the air-conditioned space in which no person is present is assigned can be excluded from the operation targets, which can contribute to energy saving.

Embodiment 3

[0088] Hereinafter, Embodiment 3 of the present disclosure will be described. Descriptions on components that correspond to those of Embodiments 1 and 2 will be omitted, and the same reference signs are assigned to the same components or equivalent components of Embodiments 1 and 2.

[0089] An air-conditioning system 100 according to present Embodiment 3 starts operation of indoor unit parts 2 that have radio wave intensities higher than or equal to a previously set reference intensity and are also within a range from the highest radio wave intensity to

the N-th highest radio wave intensity. It is noted that N is, for example, "3". In addition, the administrator can freely set N, for example, from an air-conditioning apparatus operation input unit 16. It is noted that the user other than the administrator may also set N.

[0090] Fig. 9 is a flowchart illustrating processing in a mobile terminal unit 6 up to operation start of the indoor unit parts 2 of the air-conditioning system 100 according to Embodiment 3 of the present disclosure.

[0091] Hereinafter, the processing in the mobile terminal unit 6 up to the operation start of the indoor unit parts 2 of the air-conditioning system 100 according to present Embodiment 3 will be described with reference to Fig. 9.

[0092] As the processing in steps S101 to S106 is similar to that of Embodiment 2, the description will be omitted.

(Step S111)

[0093] The air-conditioning apparatus operation management unit 15 compares the registered wireless IDs with the information of the radio wave intensities, and determines whether or not wireless IDs having the same radio wave intensity exist, or whether a plurality of wireless IDs having radio wave intensities within a previously set range exist. It is noted that this determination is performed when the N-th highest radio wave intensity is not decided as a plurality of wireless IDs having the same radio wave intensity or mutually close radio wave intensities around the N-th highest radio wave intensity exist. In other words, this determination is not performed when wireless IDs having the same radio wave intensity or mutually close radio wave intensities in ranks that are not around the N-th highest radio wave intensity and are away from the N-th highest radio wave intensity exist. When the air-conditioning apparatus operation management unit 15 determines that wireless IDs having the same radio wave intensity exist or a plurality of wireless IDs having radio wave intensities within the previously set range exist (YES), the process proceeds to the processing in step S113. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that wireless IDs having the same radio wave intensity do not exist, and also a plurality of wireless IDs having radio wave intensities within the previously set range do not exist (NO), the process proceeds to the processing in step S112. Herein, the radio wave intensities within the previously set range are ± 5 dBm, for example. In other words, when a wireless ID having the radio wave intensity at -60 dBm and a wireless ID having the radio wave intensity at -55 dBm exist, it is determined that a plurality of wireless IDs having radio wave intensities within the previously set range exist.

(Step S112)

[0094] The air-conditioning apparatus operation management unit 15 ranks the detected wireless radio waves

in a descending order of the radio wave intensity, associates the wireless IDs of the wireless communication units 3, which are provided to the indoor unit parts 2, and that transmit wireless radio waves having intensities higher than or equal to the N-th highest radio wave intensity with the information of the radio wave intensities, and registers the associated items in the air-conditioning apparatus operation management unit 15.

10 (Step S113)

[0095] The air-conditioning apparatus operation management unit 15 transmits a radio wave intensity changing command for decreasing the intensity of the radio wave to be output by a previously set value to the wireless communication units 3, which are provided to the indoor unit parts 2, and that have wireless IDs having the same radio wave intensity or wireless IDs having radio wave intensities within the previously set range, and the process proceeds to the processing in step S102. Herein, an attenuation amount of the wireless radio wave varies depending on a distance, and the difference based on the distance is more likely to be noticeable as the radio wave intensity is lower. To solve this problem, when the radio wave intensity of the wireless radio wave output from the wireless communication unit 3 is decreased, it is facilitated to determine a difference of the distance from the mobile terminal unit 6 to the indoor unit part 2. It is noted that instead of the transmission of the radio wave intensity changing command for decreasing the intensity of the radio wave to be output by a previously set value, a radio wave intensity changing command for increasing the intensity of the radio wave to be output by a previously set value may also be transmitted. In addition, information of the radio wave intensity change is registered in the air-conditioning apparatus operation management unit 15. Then, for example, after the transmission of the air-conditioning operation command, the air-conditioning apparatus operation management unit 15 transmits, to the wireless communication unit 3, which is provided to the indoor unit part 2, and in which the radio wave intensity has been changed, a radio wave intensity changing command for restoring the radio wave intensity to the original value.

45 (Step S114)

[0096] The air-conditioning apparatus operation management unit 15 transmits the operation start command to the wireless communication unit 3, which is provided to the indoor unit part 2, and that has the registered wireless ID.

[0097] Fig. 10 is a flowchart illustrating processing of the indoor unit part 2 up to the operation start of the indoor unit part 2 of the air-conditioning system 100 according to Embodiment 3 of the present disclosure.

[0098] Hereinafter, the processing of the indoor unit part 2 up to the operation start of the indoor unit part 2

of the air-conditioning system 100 according to present Embodiment 3 will be described with reference to Fig. 10.

(Step S211)

[0099] An indoor unit control unit 11 determines whether or not the operation start command is received from the mobile terminal unit 6 by using the wireless communication unit 3. When the indoor unit control unit 11 determines that the operation start command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S214. On the other hand, when the indoor unit control unit 11 determines that the operation start command is not received from the mobile terminal unit 6 (NO), the process proceeds to the processing in step S212.

(Step S212)

[0100] The indoor unit control unit 11 determines whether or not the wireless communication unit 3 receives the radio wave intensity changing command. When the indoor unit control unit 11 determines that the wireless communication unit 3 receives the radio wave intensity changing command (YES), the process proceeds to the processing in step S213. On the other hand, when the indoor unit control unit 11 determines that the wireless communication unit 3 does not receive the radio wave intensity changing command (NO), the process proceeds to the processing in step S211.

(Step S213)

[0101] The indoor unit control unit 11 decreases the intensity of the radio wave output from the wireless communication unit 3 by the previously set value, and the process proceeds to the processing in step S211.

(Step S214)

[0102] The indoor unit control unit 11 determines whether or not a person in the air-conditioned space assigned to the indoor unit part 2 is detected by the human-sensing detection unit 4. When the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is detected (YES), the process proceeds to the processing in step S215. On the other hand, when the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is not detected (NO), the process proceeds to the processing in step S211.

[0103] It is noted that some indoor unit parts 2 may include no human-sensing detection unit 4. In such a case, the determination processing step S214 may be skipped. In this case, in the determination in step S211, when the indoor unit control unit 11 determines that the operation start command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S215. It is noted that according to present Embodiment 3, the indoor unit parts 2 that have radio wave intensities in the range between the highest radio wave intensity and the N-th highest radio wave intensity are set as the operation targets, and among these indoor unit parts 2, the indoor unit part 2 to which the air-conditioned space in which a person is not detected is assigned is excluded from the operation targets. For this reason, the number of the indoor unit parts 2 through which the air-conditioning operation is actually executed is lower than N in some cases. To solve the problem, when comfort is more important than energy saving, the processing (steps S101 to S114) for deciding the ones of indoor unit parts 2 corresponding to the operation targets may be repeatedly performed until the number of ones of the indoor unit parts 2 corresponding to the operation targets reaches N.

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20 (Step S215)

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terminal unit 6 (YES), the process proceeds to the processing in step S215. It is noted that according to present Embodiment 3, the indoor unit parts 2 that have radio wave intensities in the range between the highest radio wave intensity and the N-th highest radio wave intensity are set as the operation targets, and among these indoor unit parts 2, the indoor unit part 2 to which the air-conditioned space in which a person is not detected is assigned is excluded from the operation targets. For this reason, the number of the indoor unit parts 2 through which the air-conditioning operation is actually executed is lower than N in some cases. To solve the problem, when comfort is more important than energy saving, the processing (steps S101 to S114) for deciding the ones of indoor unit parts 2 corresponding to the operation targets may be repeatedly performed until the number of ones of the indoor unit parts 2 corresponding to the operation targets reaches N.

[0104] The indoor unit control unit 11 starts the operation of the indoor unit part 2 and also transmits the operation start command to an outdoor unit control unit 14 by using a wired communication line section 7 to start the operation of the outdoor unit part 5. The air-conditioning operation is thus executed.

[0105] As described above, in the air-conditioning system 100 according to present Embodiment 3, the mobile terminal unit 6 is configured to rank the detected wireless radio waves in a descending order of the radio wave intensity, and transmit the operation start command to the wireless communication units 3 that transmit wireless radio waves in ranks higher than or equal to a previously set rank.

[0106] With the air-conditioning system 100 according to present Embodiment 3, the mobile terminal unit 6 ranks the detected wireless radio waves in a descending order of the radio wave intensity, and transmits the operation start command to the wireless communication units 3 that transmit wireless radio waves in the ranks higher than or equal to the previously set rank. For this reason, a condition for deciding the indoor unit parts 2 to be operated can be customized by the user.

[0107] In addition, in the air-conditioning system 100 according to present Embodiment 3, when the same radio wave intensities are detected or a plurality of radio wave intensities within the previously set range are detected, the mobile terminal unit 6 transmits the radio wave intensity changing command to the wireless communication units 3 that transmit wireless radio waves having the same radio wave intensity or radio wave intensities within the previously set range. In addition, the wireless communication units 3 that have received the radio wave intensity changing command are configured to decrease the radio wave intensity of the wireless radio wave to be transmitted.

[0108] With the air-conditioning system 100 according

to present Embodiment 3, when the same radio wave intensities are detected or a plurality of radio wave intensities within the previously set range are detected, the mobile terminal unit 6 transmits the radio wave intensity changing command to the wireless communication units 3 that transmit wireless radio waves having the above-described radio wave intensities. For this reason, ranking of the distances from the respective indoor unit parts 2 to the mobile terminal unit 6 can be precisely decided.

Embodiment 4

[0109] Hereinafter, Embodiment 4 of the present disclosure will be described. Descriptions on components that correspond to those of Embodiments 1 to 3 will be omitted, and the same reference signs are assigned to the same components or equivalent components of Embodiments 1 to 3.

[0110] An air-conditioning system 100 according to present Embodiment 4 performs the processing for facilitating the selection of an indoor unit part 2 to which an air-conditioned space in which a person is present is assigned as an operation target.

[0111] Fig. 11 is a flowchart illustrating processing of the indoor unit part 2 up to operation start of the indoor unit part 2 of the air-conditioning system 100 according to Embodiment 4 of the present disclosure.

[0112] Hereinafter, the processing of the indoor unit part 2 up to the operation start of the indoor unit part 2 of the air-conditioning system 100 according to present Embodiment 4 will be described with reference to Fig. 11.

(Step S221)

[0113] An indoor unit control unit 11 determines whether or not a person in the air-conditioned space assigned to the indoor unit part 2 is detected by a human-sensing detection unit 4. When the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is detected (YES), the process proceeds to the processing in step S222. On the other hand, when the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is not detected (NO), the process proceeds to the processing in step S223.

(Step S222)

[0114] The indoor unit control unit 11 increases the intensity of the radio wave output from the wireless communication unit 3 by a previously set value. This is, by increasing the intensity of the radio wave output from the wireless communication unit 3, to facilitate the selection of the indoor unit part 2 to which the air-conditioned space in which a person is present is assigned as the operation target. It is noted that when the intensity of the radio wave output from the wireless communication unit 3 is already increased by the previously set value, this processing is

skipped.

(Step S223)

5 **[0115]** When the intensity of the radio wave output from the wireless communication unit 3 is already increased by the previously set value, the indoor unit control unit 11 restores the intensity of the radio wave output from the wireless communication unit 3 to the original value.
10 This is to avoid the facilitation of the indoor unit part 2 to which the air-conditioned space in which no person is present is assigned to be selected as the operation target.

(Step S224)

15 **[0116]** The indoor unit control unit 11 determines whether or not the operation start command is received from the mobile terminal unit 6 by using the wireless communication unit 3. When the indoor unit control unit 11 determines that the operation start command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S225. On the other hand, when the indoor unit control unit 11 determines that the operation start command is not received from the mobile terminal unit 6 (NO), the process proceeds to the processing in step S221.
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(Step S225)

30 **[0117]** The indoor unit control unit 11 starts the operation of the indoor unit part 2 and also transmits the operation start command to the outdoor unit control unit 14 by using the wired communication line section 7 to start the operation of the outdoor unit part 5. The air-conditioning operation is thus executed.
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[0118] As described above, when the human-sensing detection unit 4 provided to the indoor unit part 2 detects a person, the indoor unit part 2 of the air-conditioning system 100 according to present Embodiment 4 is configured to increase the radio wave intensity of the wireless radio wave transmitted by the wireless communication unit 3.
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[0119] With the air-conditioning system 100 according to present Embodiment 4, when the human-sensing detection unit 4 provided to the indoor unit part 2 detects a person, the indoor unit part 2 increases the radio wave intensity of the wireless radio wave transmitted by the wireless communication unit 3. For this reason, the selection of the indoor unit part 2 to which the air-conditioned space in which a person is present is assigned as the operation target can be facilitated. It is noted that the processing for increasing the radio wave intensity of the wireless radio wave transmitted by the wireless communication unit 3 when the human-sensing detection unit 4 provided to the indoor unit part 2 detects the person is also effective in a case where the indoor unit parts 2 up to the N-th indoor unit part 2 are not found according to Embodiment 2.
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Embodiment 5

[0120] Hereinafter, Embodiment 5 of the present disclosure will be described. Descriptions on components that correspond to those of Embodiments 1 to 4 will be omitted, and the same reference signs are assigned to the same components or equivalent components of Embodiments 1 to 4.

[0121] Similarly as in Embodiment 4, an air-conditioning system 100 according to present Embodiment 5 performs processing for facilitating selection of an indoor unit part 2 to which an air-conditioned space in which a person is present is assigned as an operation target.

[0122] Fig. 12 is a flowchart illustrating processing in a mobile terminal unit 6 up to operation start of the indoor unit parts 2 of the air-conditioning system 100 according to Embodiment 5 of the present disclosure.

[0123] Hereinafter, the processing in the mobile terminal unit 6 up to operation start of the indoor unit parts 2 of the air-conditioning system 100 according to present Embodiment 5 will be described with reference to Fig. 12.

[0124] As the processing in steps S101 to S108 is similar to that of Embodiment 2, the description will be omitted.

(Step S121)

[0125] The air-conditioning apparatus operation management unit 15 determines whether or not a mobile terminal side wireless communication unit 9 receives a radio wave intensity changing command. Herein, the radio wave intensity changing command is transmitted so that, as will be described below, the indoor unit parts 2 provided with the human-sensing detection units 4 that each detect a person in an air-conditioned space assigned to the indoor unit part 2 are facilitated to be selected as the operation targets. When the air-conditioning apparatus operation management unit 15 determines that the mobile terminal side wireless communication unit 9 receives the radio wave intensity changing command (YES), the process proceeds to the processing in step S122. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the mobile terminal side wireless communication unit 9 does not receive the radio wave intensity changing command (NO), the process proceeds to the processing in step S105.

(Step S122)

[0126] The air-conditioning apparatus operation management unit 15 checks a wireless ID of a wireless communication unit 3 that is a transmission source of the radio wave intensity changing command, and transmits the radio wave intensity changing command for decreasing the intensity of the radio wave to be output by a previously set value to the wireless communication units 3 of the indoor unit parts 2 other than the indoor unit part 2 having the wireless ID, and the process proceeds to

the processing in step S102.

[0127] Fig. 13 is a flowchart illustrating processing of the indoor unit part 2 up to the operation start of the indoor unit part 2 of the air-conditioning system 100 according to Embodiment 5 of the present disclosure.

[0128] Hereinafter, the processing of the indoor unit part 2 up to the operation start of the indoor unit part 2 of the air-conditioning system 100 according to present Embodiment 5 will be described with reference to Fig. 13.

(Step S231)

[0129] An indoor unit control unit 11 determines whether or not a person in the air-conditioned space assigned to the indoor unit part 2 is detected by the human-sensing detection unit 4. When the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is detected (YES), the process proceeds to the processing in step S232. On the other hand, when the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is not detected (NO), the process proceeds to the processing in step S233.

(Step S232)

[0130] The indoor unit control unit 11 transmits the radio wave intensity changing command for decreasing the intensity of the radio wave output from the wireless communication unit 3 of other indoor unit part 2 by a previously set value to the mobile terminal side wireless communication unit 9. This is, by decreasing the intensity of the radio wave output from the wireless communication unit 3 of other indoor unit part 2 to relatively increase the intensity of the radio wave output from the wireless communication unit 3 of the indoor unit part 2 having the wireless ID, to facilitate the selection of the indoor unit part 2 to which the air-conditioned space in which a person is present is assigned as the operation target. It is noted that this processing is skipped when the radio wave intensity changing command for decreasing the intensity of the radio wave output from the wireless communication unit 3 of other indoor unit part 2 is already transmitted.

(Step S233)

[0131] When the radio wave intensity changing command for decreasing the intensity of the radio wave output from the wireless communication unit 3 of other indoor unit part 2 is already transmitted, the indoor unit control unit 11 transmits, to the mobile terminal side wireless communication unit 9, the radio wave intensity changing command for restoring the intensity of the radio wave output from the wireless communication unit 3 of other indoor unit part 2 to the original radio wave intensity. This is to avoid facilitation of the indoor unit part 2 to which the air-conditioned space in which no person is present is assigned to be selected as the operation target.

(Step S234)

[0132] The indoor unit control unit 11 determines whether or not the operation start command is received from the mobile terminal unit 6 by using the wireless communication unit 3. When the indoor unit control unit 11 determines that the operation start command is received from the mobile terminal unit 6 (YES), the process proceeds to the processing in step S235. On the other hand, when the indoor unit control unit 11 determines that the operation start command is not received from the mobile terminal unit 6 (NO), the process proceeds to the processing in step S236.

(Step S235)

[0133] The indoor unit control unit 11 starts the operation of the indoor unit part 2 and also transmits the operation start command to the outdoor unit control unit 14 by using the wired communication line section 7 to start the operation of the outdoor unit part 5. The air-conditioning operation is thus executed.

(Step S236)

[0134] The indoor unit control unit 11 determines whether or not the wireless communication unit 3 receives the radio wave intensity changing command. When the indoor unit control unit 11 determines that the wireless communication unit 3 receives the radio wave intensity changing command (YES), the process proceeds to the processing in step S237. On the other hand, when the indoor unit control unit 11 determines that the wireless communication unit 3 does not receive the radio wave intensity changing command (NO), the process proceeds to the processing in step S231.

(Step S237)

[0135] The indoor unit control unit 11 determines whether or not a person in the air-conditioned space assigned to the indoor unit part 2 is detected by the human-sensing detection unit 4. When the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is detected (YES), the process proceeds to the processing in step S231. On the other hand, when the indoor unit control unit 11 determines that a person in the air-conditioned space assigned to the indoor unit part 2 is not detected (NO), the process proceeds to the processing in step S238.

(Step S238)

[0136] The indoor unit control unit 11 decreases the intensity of the radio wave output from the wireless communication unit 3 by the previously set value, and the process proceeds to the processing in step S231.

[0137] As described above, when the human-sensing detection unit 4 provided to the indoor unit part 2 detects a person, the indoor unit part 2 of the air-conditioning system 100 according to present Embodiment 5 is configured to transmit the radio wave intensity changing command to the mobile terminal unit 6. In addition, when the radio wave intensity changing command is received, the mobile terminal unit 6 transmits the radio wave intensity changing command to the wireless communication units 3 other than the wireless communication unit 3 that is the transmission source of the radio wave intensity changing command.

[0138] With the air-conditioning system 100 according to present Embodiment 5, when the radio wave intensity changing command is received, the mobile terminal unit 6 transmits the radio wave intensity changing command to the wireless communication units 3 other than the wireless communication unit 3 that is the transmission source of the radio wave intensity changing command. In this manner, by decreasing the intensity of the radio wave output from the wireless communication unit 3 provided to the indoor unit part 2 other than the indoor unit part 2 provided with the human-sensing detection unit 4 that detects a person, and the intensity of the radio wave output from the wireless communication unit 3 of the indoor unit part 2 provided with the human-sensing detection unit 4 that detects a person is relatively increased. The selection of the indoor unit part 2 to which the air-conditioned space in which a person is present is assigned as the operation target can be thus facilitated.

Embodiment 6

[0139] Hereinafter, Embodiment 6 of the present disclosure will be described. Descriptions on components that correspond to those of Embodiments 1 to 5 will be omitted, and the same reference signs are assigned to the same components or equivalent components of Embodiments 1 to 5.

[0140] Fig. 14 is a flowchart illustrating processing in a mobile terminal unit 6 up to operation start of indoor unit parts 2 of an air-conditioning system 100 according to Embodiment 6 of the present disclosure. Fig. 15 is a diagram for describing processing for excluding, from the operation targets, the indoor unit part 2 having a nonadjacent address of the air-conditioning system 100 according to Embodiment 6 of the present disclosure. It is noted that the "nonadjacent address" refers to an address that is not adjacent to other addresses among a plurality of addresses. In addition, with regard to the nonadjacent address, the address is valid when the address is set in accordance with a certain rule as in a case where columns are defined in alphabet letters and rows are defined in numbers as illustrated in Fig. 15.

[0141] Hereinafter, the processing in the mobile terminal unit 6 up to the operation start of the indoor unit parts 2 of the air-conditioning system 100 according to present Embodiment 6 will be described with reference to Fig. 14

and Fig. 15.

[0142] As the processing in steps S101 to S103, S107, and S108 is similar to that of Embodiment 2, the description will be omitted.

(Step S131)

[0143] The air-conditioning apparatus operation management unit 15 checks the wireless ID of a wireless communication unit 3 that is a transmission source and an address of the wireless communication unit 3 that is the transmission source, and also starts to measure the radio wave intensity (RSSI). Furthermore, the air-conditioning apparatus operation management unit 15 resets the measured period of time from the start of the detection of the wireless radio waves. Herein, to determine a fluctuation of the radio wave intensity, the air-conditioning apparatus operation management unit 15 uses an average or median value from results of multiple measurements, and decides the radio wave intensity of the detected wireless radio wave.

(Step S132)

[0144] The air-conditioning apparatus operation management unit 15 determines whether or not the radio wave intensity of the detected wireless radio wave that is decided in the processing in step S131 is higher than or equal to a previously set reference intensity. When the air-conditioning apparatus operation management unit 15 determines that the radio wave intensity of the detected wireless radio wave is higher than or equal to the reference intensity (YES), the process proceeds to the processing in step S133. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the radio wave intensity of the detected wireless radio wave is not higher than or equal to the reference intensity (NO), the process proceeds to the processing in step S134.

(Step S133)

[0145] The air-conditioning apparatus operation management unit 15 determines whether or not the address of the wireless communication unit 3 of the indoor unit part 2 is a nonadjacent address. When the air-conditioning apparatus operation management unit 15 determines that the address of the wireless communication unit 3 of the indoor unit part 2 is a nonadjacent address (YES), the process proceeds to the processing in step S134. On the other hand, when the air-conditioning apparatus operation management unit 15 determines that the address of the wireless communication unit 3 of the indoor unit part 2 is not a nonadjacent address (NO), the process proceeds to the processing in step S107.

(Step S134)

[0146] The air-conditioning apparatus operation management unit 15 discards information of the wireless ID of the wireless communication unit 3 of the indoor unit part 2 having the radio wave intensity below the reference intensity or having a nonadjacent address.

[0147] Herein, as illustrated in Fig. 15, for example, the addresses of the wireless communication units 3 of the indoor unit parts 2 that have radio wave intensities higher than or equal to the previously set reference intensity (-70 dBm or above) are "1-A", "2-A", and "2-E". In this case, "1-A" and "2-A" are mutually adjacent addresses, but the address "2-E" is not adjacent to the addresses "1-A" and "2-A" and is thus a nonadjacent address. In this case, the wireless ID of the wireless communication unit 3 of the indoor unit part 2 having the address "2-E" is excluded from the operation targets. This is because the air-conditioning apparatus operation management unit 15 avoids an erroneous detection of the radio wave intensity due to an influence of an obstacle. In other words, in some cases, the air-conditioning apparatus operation management unit 15 detects the wireless radio wave transmitted from the wireless communication unit 3 of the indoor unit part 2 in a farther location from the mobile terminal unit 6 at the higher radio wave intensity than the radio wave intensity of the wireless radio wave transmitted from the wireless communication unit 3 of the indoor unit part 2 in a closer location from the mobile terminal unit 6. To solve the problem, in the processing in steps S133 and S134, when the wireless ID of the wireless communication unit 3 of the indoor unit part 2 having a nonadjacent address is excluded from the operation targets as described above, the erroneous detection of the radio wave intensity can be avoided. It is noted that by associating the wireless ID with the location of the indoor unit part 2, the erroneous detection of the radio wave intensity may also be avoided as described above with reference to the wireless ID instead of the address.

[0148] Herein, when a plurality of wireless radio waves are detected in the processing in step S103, the air-conditioning apparatus operation management unit 15 performs the processing in steps S131 to S134 the same number of times as the number of detected wireless radio waves.

[0149] As described above, in the air-conditioning system 100 according to present Embodiment 6, the mobile terminal unit 6 obtains the address of the wireless communication unit 3 that transmits the wireless radio wave having an intensity higher than or equal to the previously set reference intensity. Then, the mobile terminal unit 6 excludes the wireless communication unit 3 having a nonadjacent address from the targets to which the operation start command is transmitted.

[0150] With the air-conditioning system 100 according to present Embodiment 6, as the wireless communication unit 3 having a nonadjacent address is excluded from

the targets to which the operation start command is transmitted, the erroneous detection of the radio wave intensity can be avoided.

Reference Signs List

[0151] 2 indoor unit part 3 wireless communication unit 4 human-sensing detection unit 5 outdoor unit part 6 mobile terminal unit 7 wired communication line section 8 wireless communication line section 9 mobile terminal side wireless communication unit 11 indoor unit control unit 12 wireless ID unit 13 wireless transmission and reception unit 14 outdoor unit control unit 15 air-conditioning apparatus operation management unit 16 air-conditioning apparatus operation input unit 17 air-conditioning apparatus information display unit 100 air-conditioning system

Claims

1. An air-conditioning system comprising:

a plurality of indoor unit parts having wireless communication units configured to transmit wireless radio waves; and
a mobile terminal unit configured to perform a wireless communication with each of the wireless communication units,
the mobile terminal unit including
an air-conditioning apparatus operation input unit configured to accept input from a user,
an air-conditioning apparatus information display unit configured to display information to the user, and
an air-conditioning apparatus operation management unit configured to control the plurality of indoor unit parts,
the air-conditioning apparatus operation management unit being configured to cause the air-conditioning apparatus information display unit to display a list of the plurality of indoor unit parts and being configured to cause the air-conditioning apparatus information display unit also to perform display for urging selection of ones of the plurality of indoor unit parts as targets of a collective setting operation,
when ones of the plurality of indoor unit parts are selected from the air-conditioning apparatus operation input unit, the air-conditioning apparatus operation management unit being configured to set the selected ones of the plurality of indoor unit parts as a group.

2. The air-conditioning system of claim 1, wherein, when the air-conditioning apparatus operation management unit accepts input of the collective setting operation and selection of the group from the air-

conditioning apparatus operation input unit, the air-conditioning apparatus operation management unit is configured to transmit an air-conditioning operation command to all the wireless communication units of ones of the plurality of indoor unit parts registered in the selected group.

3. The air-conditioning system of claim 2, wherein the air-conditioning apparatus operation management unit has information related to a user ID, and, when the air-conditioning apparatus operation management unit accepts input of a user ID of an administrator from the air-conditioning apparatus operation input unit with reference to the information related to the user ID, the air-conditioning apparatus operation management unit is configured to cause the air-conditioning apparatus information display unit to display the list of the plurality of indoor unit parts and is configured to cause the air-conditioning apparatus information display unit also to perform the display for urging the selection of ones of the plurality of indoor unit parts as the targets of the collective setting operation.

4. The air-conditioning system of claim 3, wherein, in a case where the air-conditioning apparatus operation management unit accepts the input of the user ID of the administrator from the air-conditioning apparatus operation input unit with reference to the information related to the user ID, when a group is set in advance, the air-conditioning apparatus operation management unit is configured to cause the air-conditioning apparatus information display unit to perform display for urging the user to input on whether or not the group is reset.

5. The air-conditioning system of any one of claims 1 to 4, wherein an application program is installed in the mobile terminal unit, the application program is configured to cause the air-conditioning apparatus information display unit to execute processing for displaying the list of the plurality of indoor unit parts and also performing the display for urging the selection of ones of the plurality of indoor unit parts as the targets of the collective setting operation, and, when ones of the plurality of indoor unit parts are selected from the air-conditioning apparatus operation input unit, the application program is configured to cause the mobile terminal unit to execute processing for setting the selected ones of the plurality of indoor unit parts as the group.

6. An application program configured to cause a computer to execute processing for causing a display unit configured to display information to a user to display a list of indoor

unit parts and also to perform display for urging selection of ones of the indoor unit parts as targets of a collective setting operation, and, when ones of the indoor unit parts are selected from an input unit configured to accept input from the user, processing for setting the selected ones of the indoor unit parts as a group.

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FIG. 1

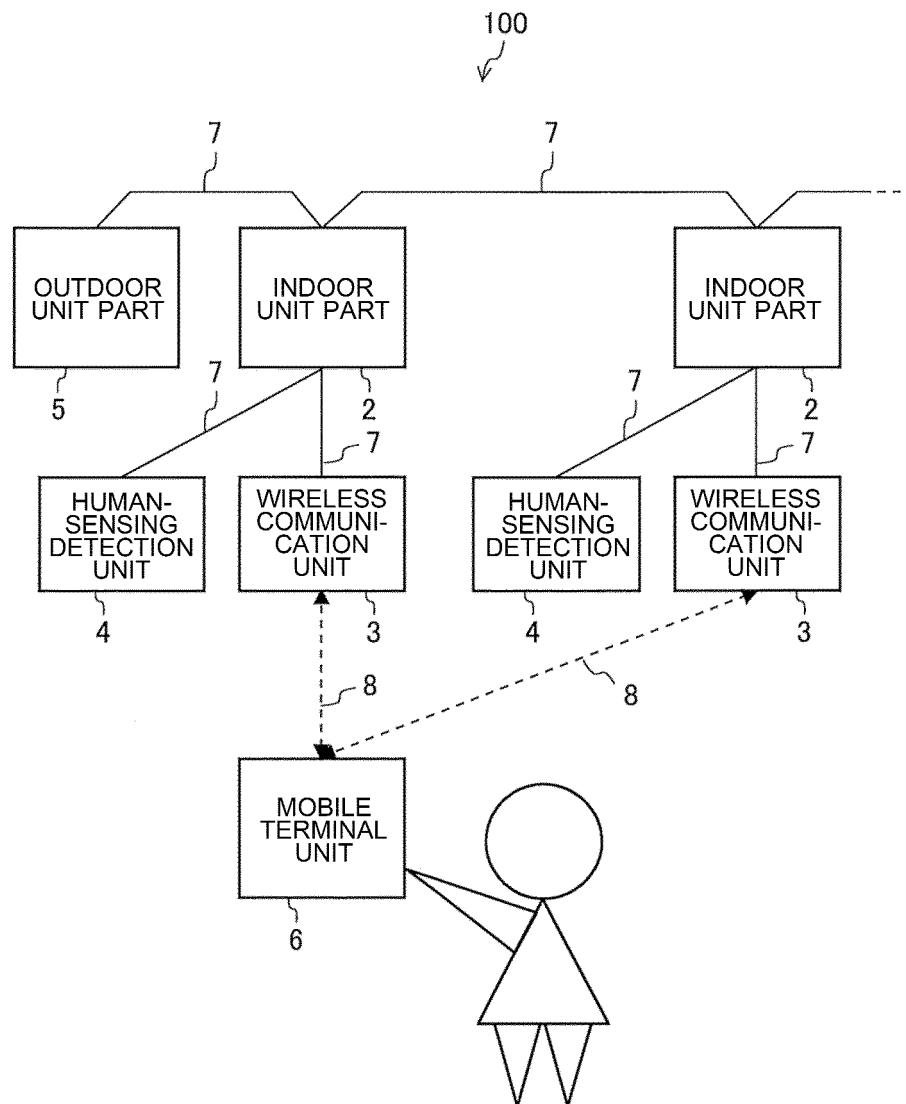


FIG. 2

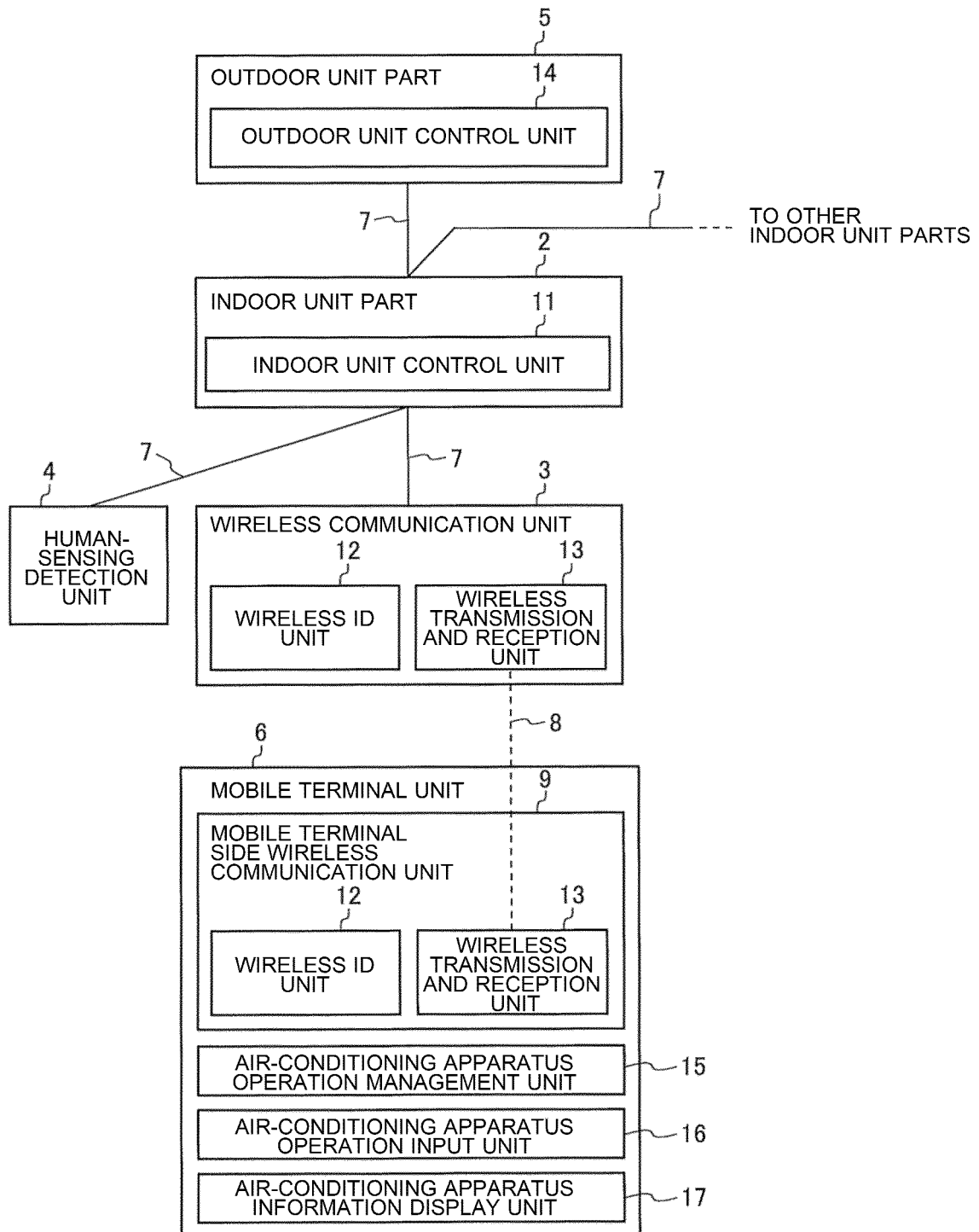


FIG. 3

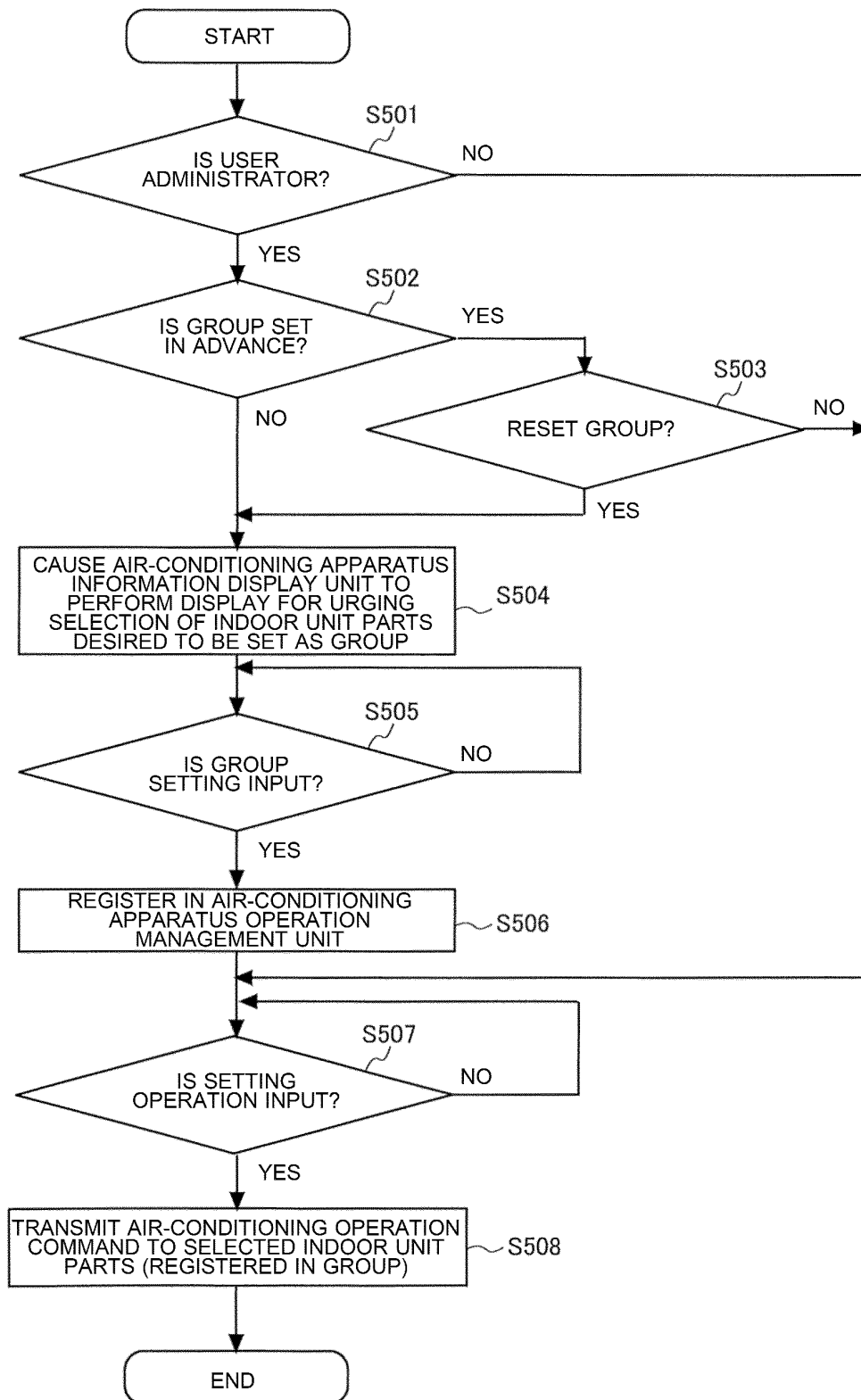


FIG. 4

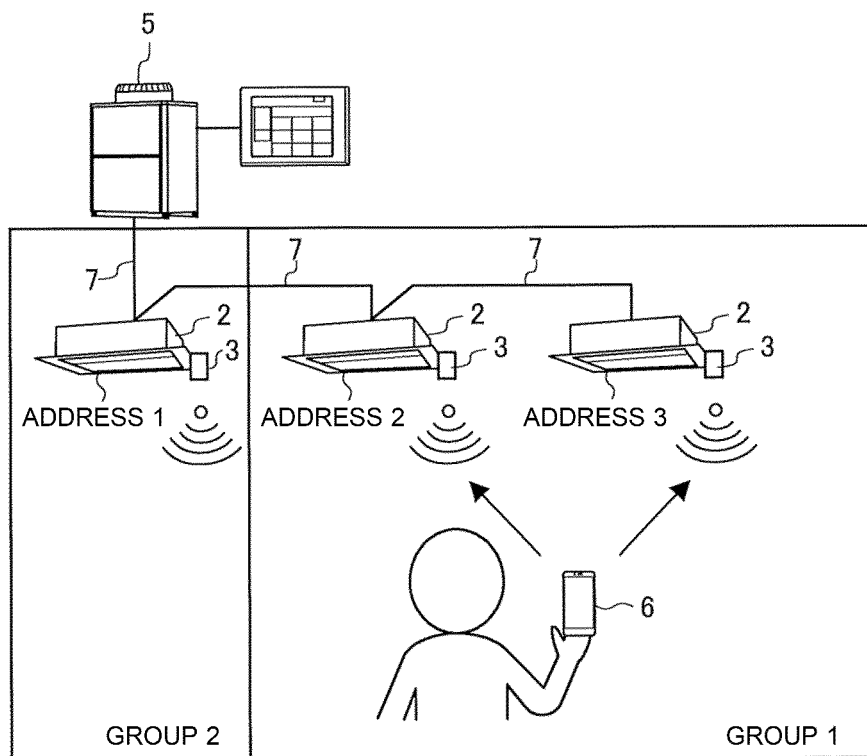


FIG. 5

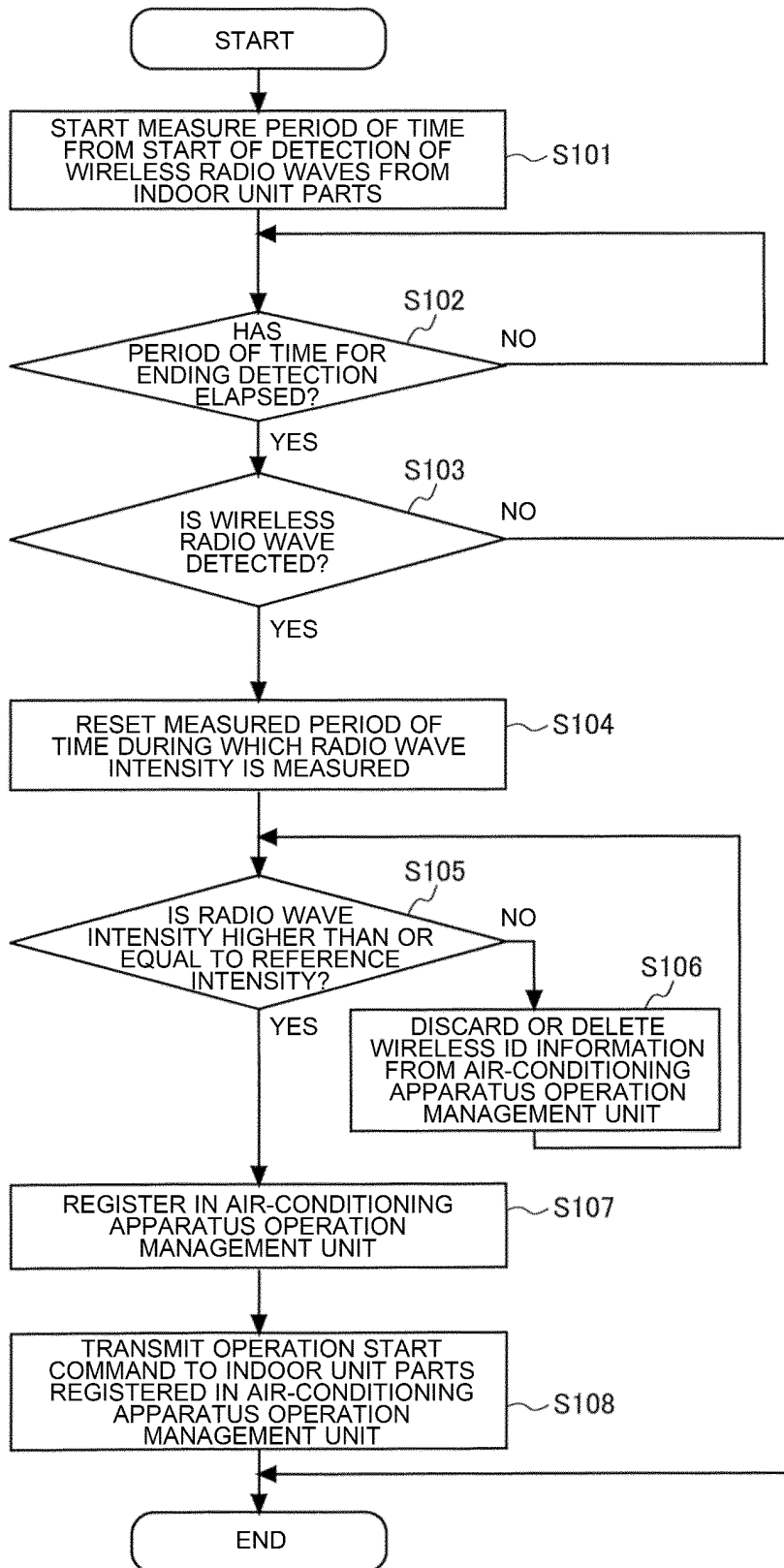


FIG. 6

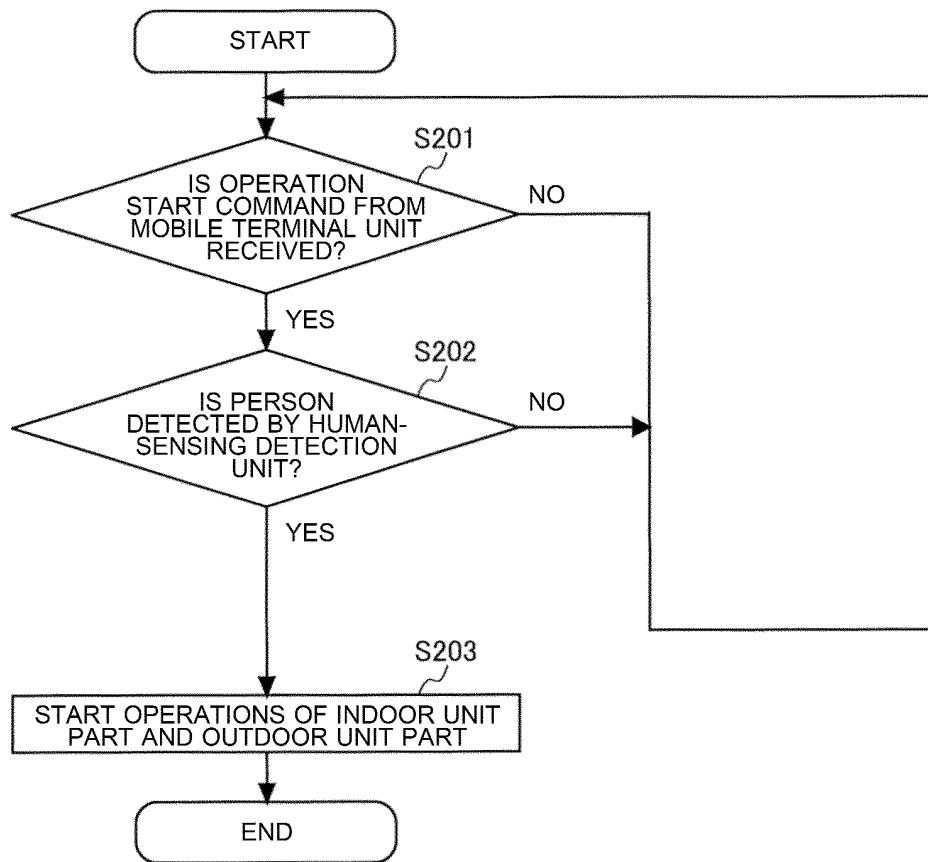


FIG. 7

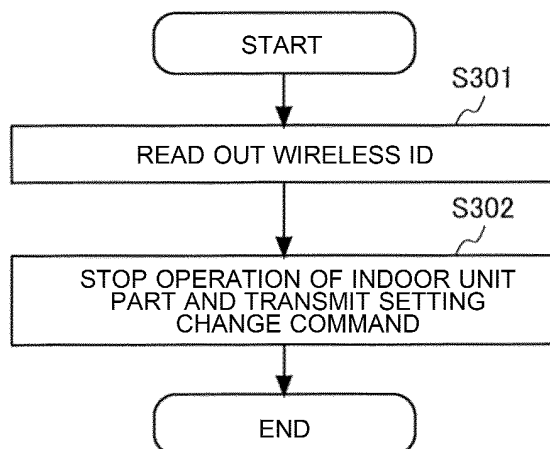


FIG. 8

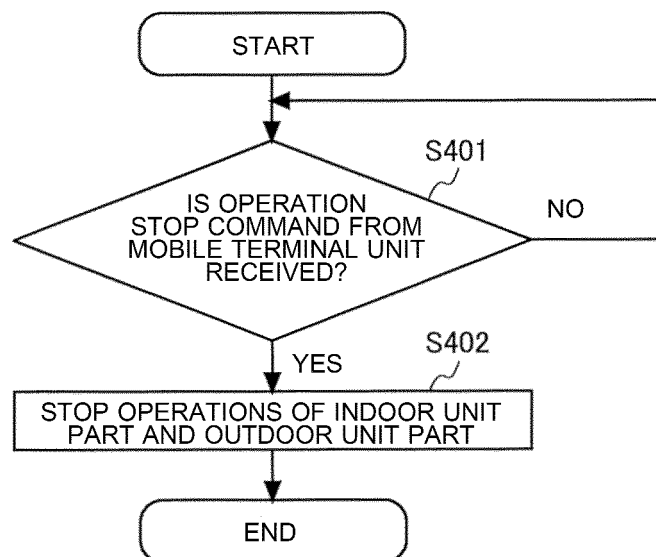


FIG. 9

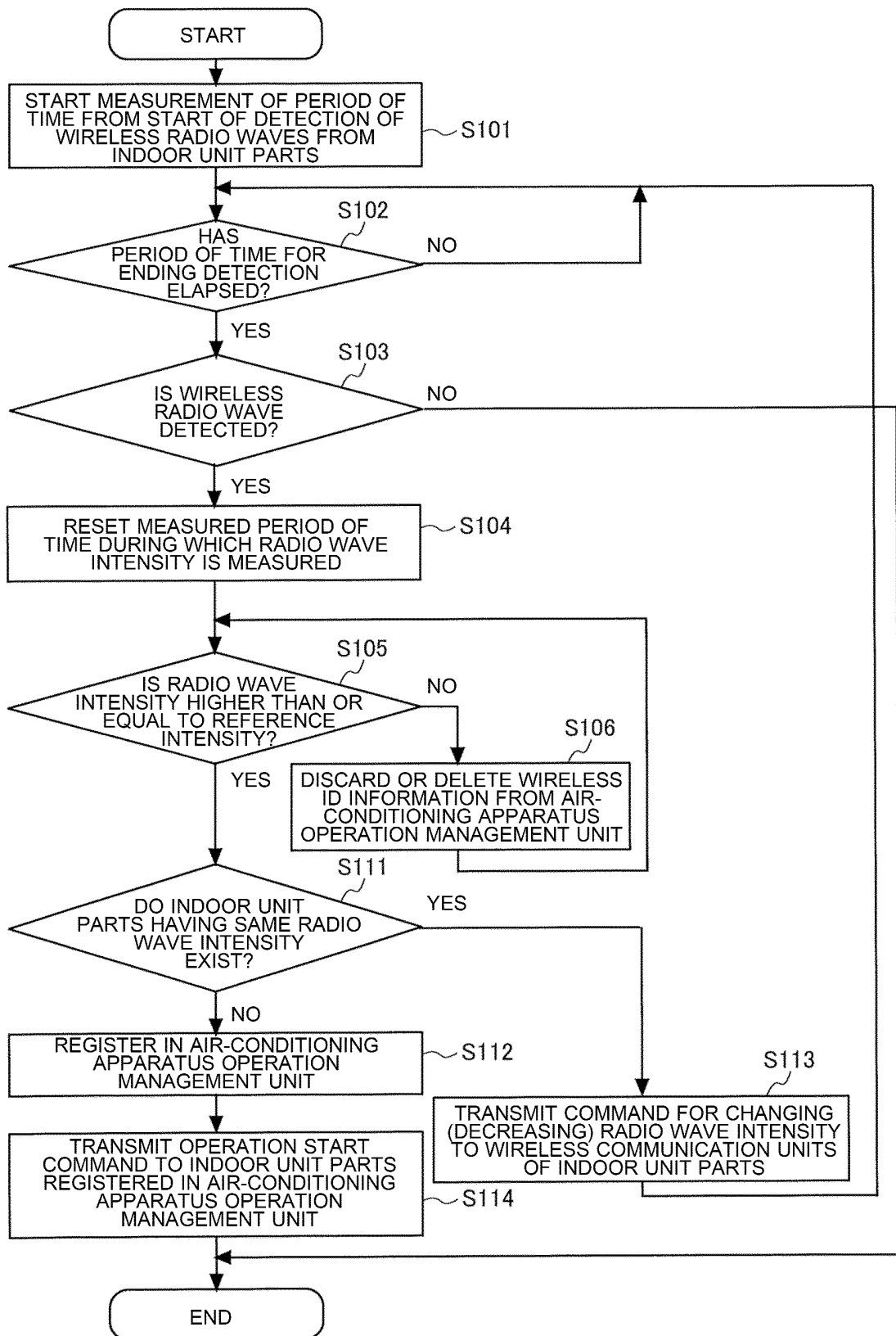


FIG. 10

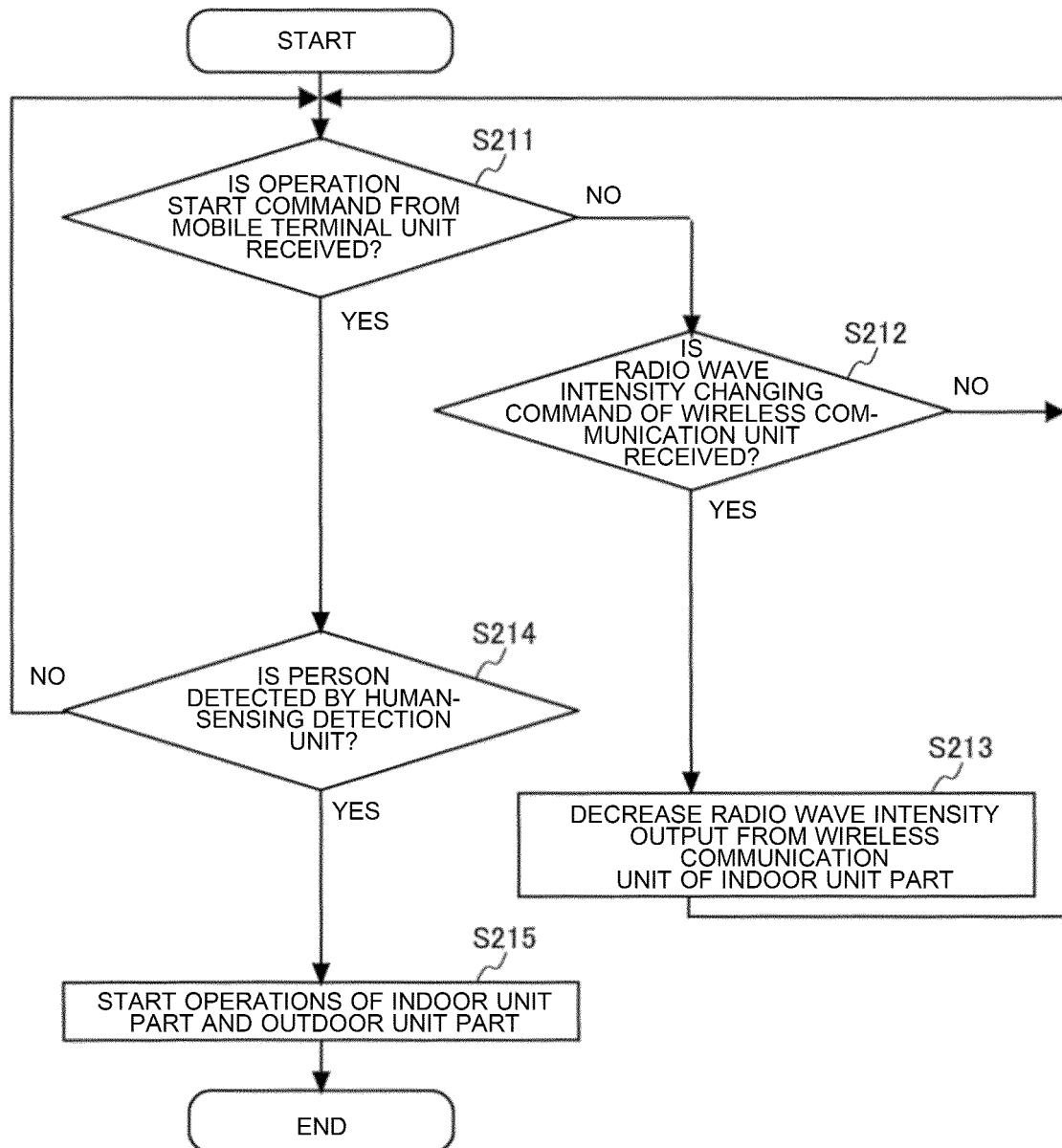


FIG. 11

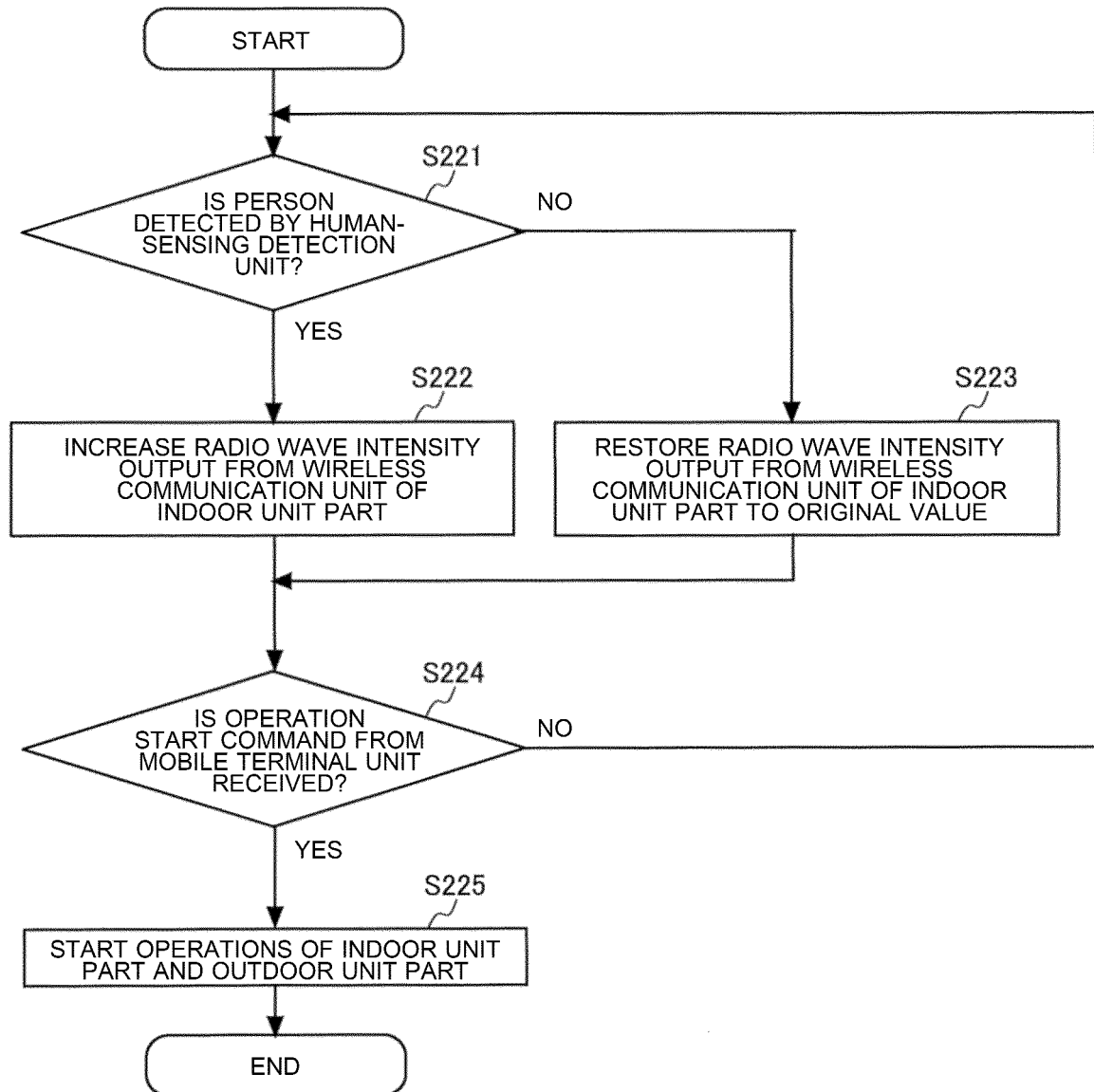


FIG. 12

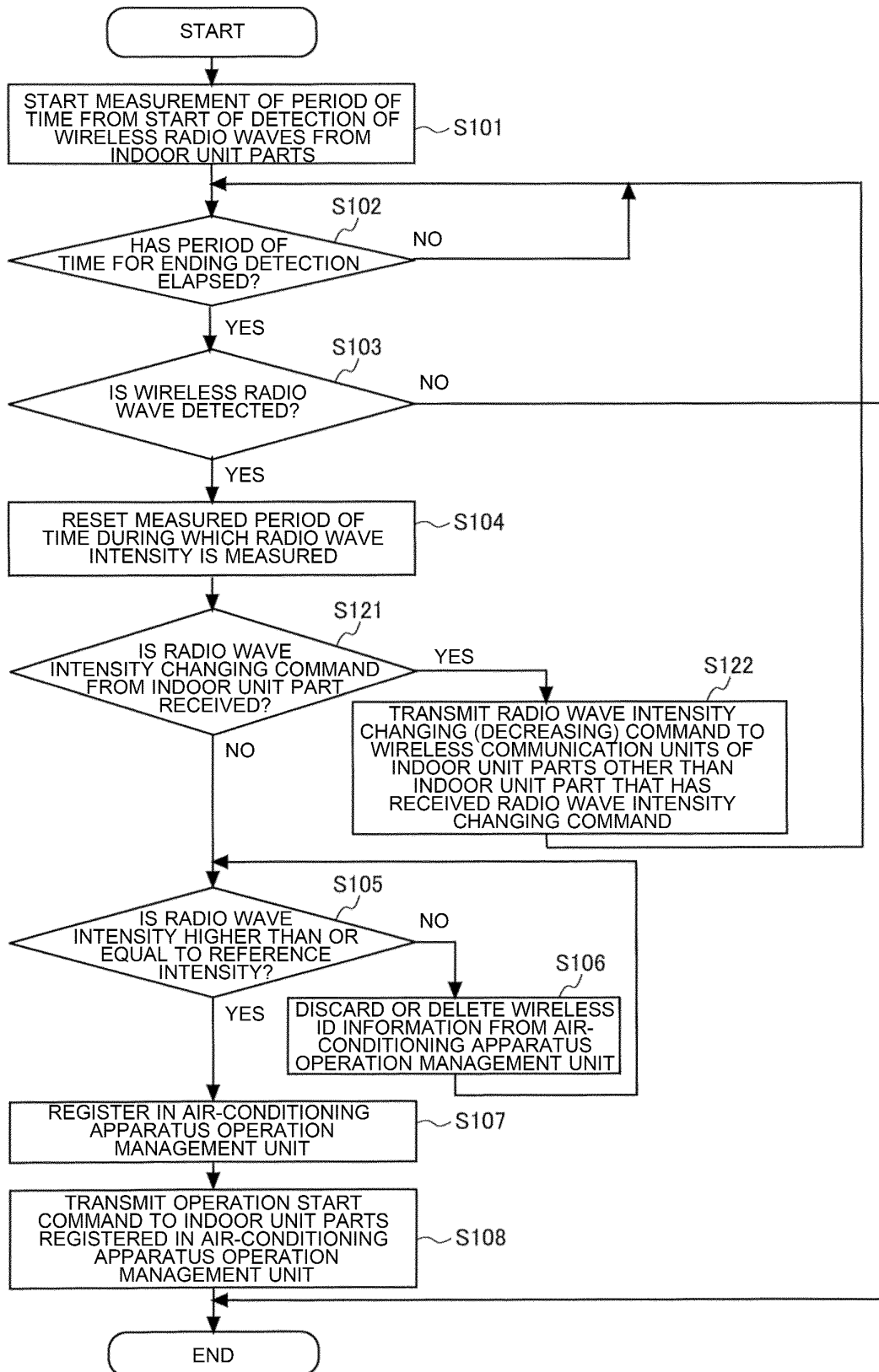


FIG. 13

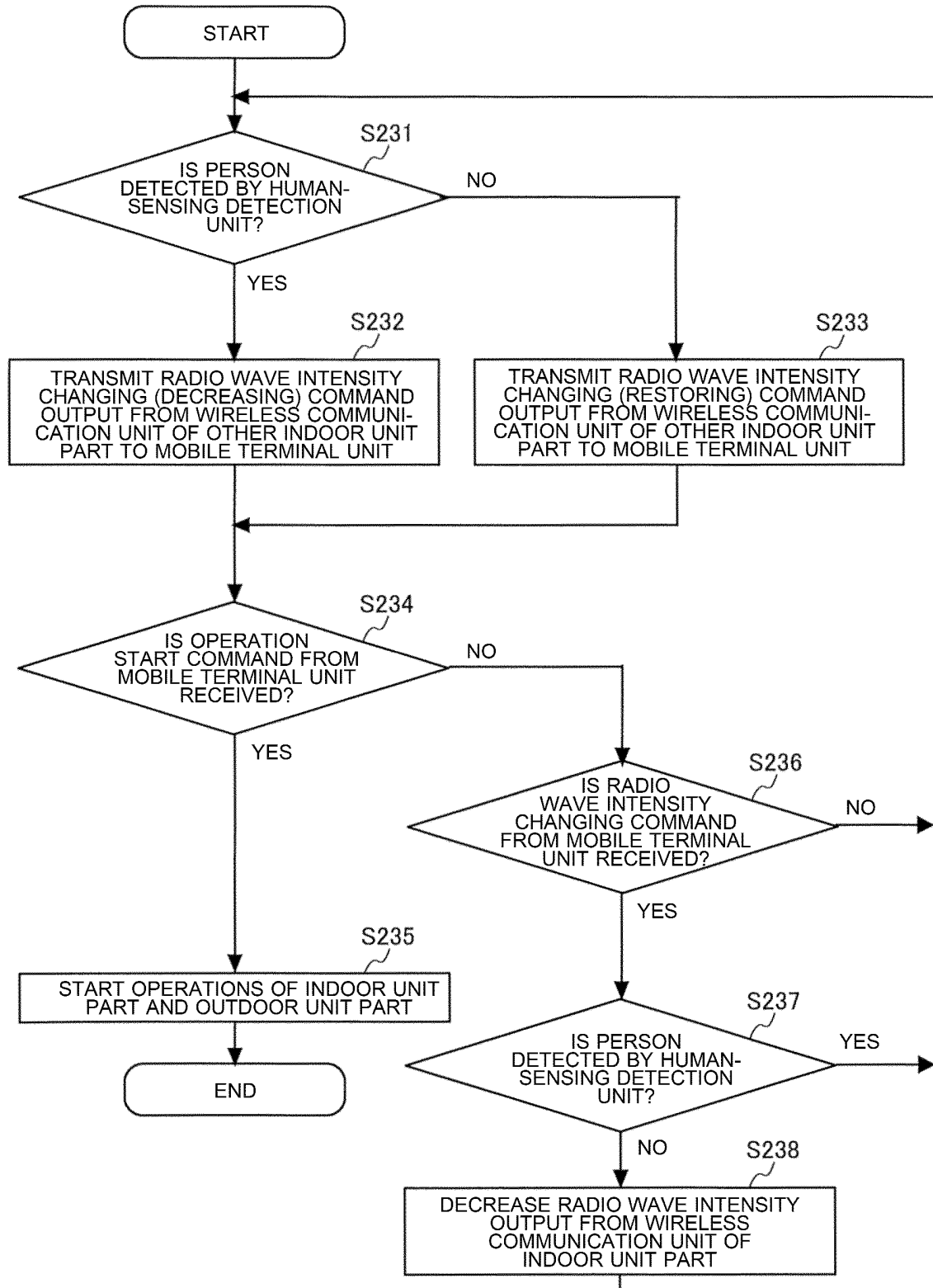


FIG. 14

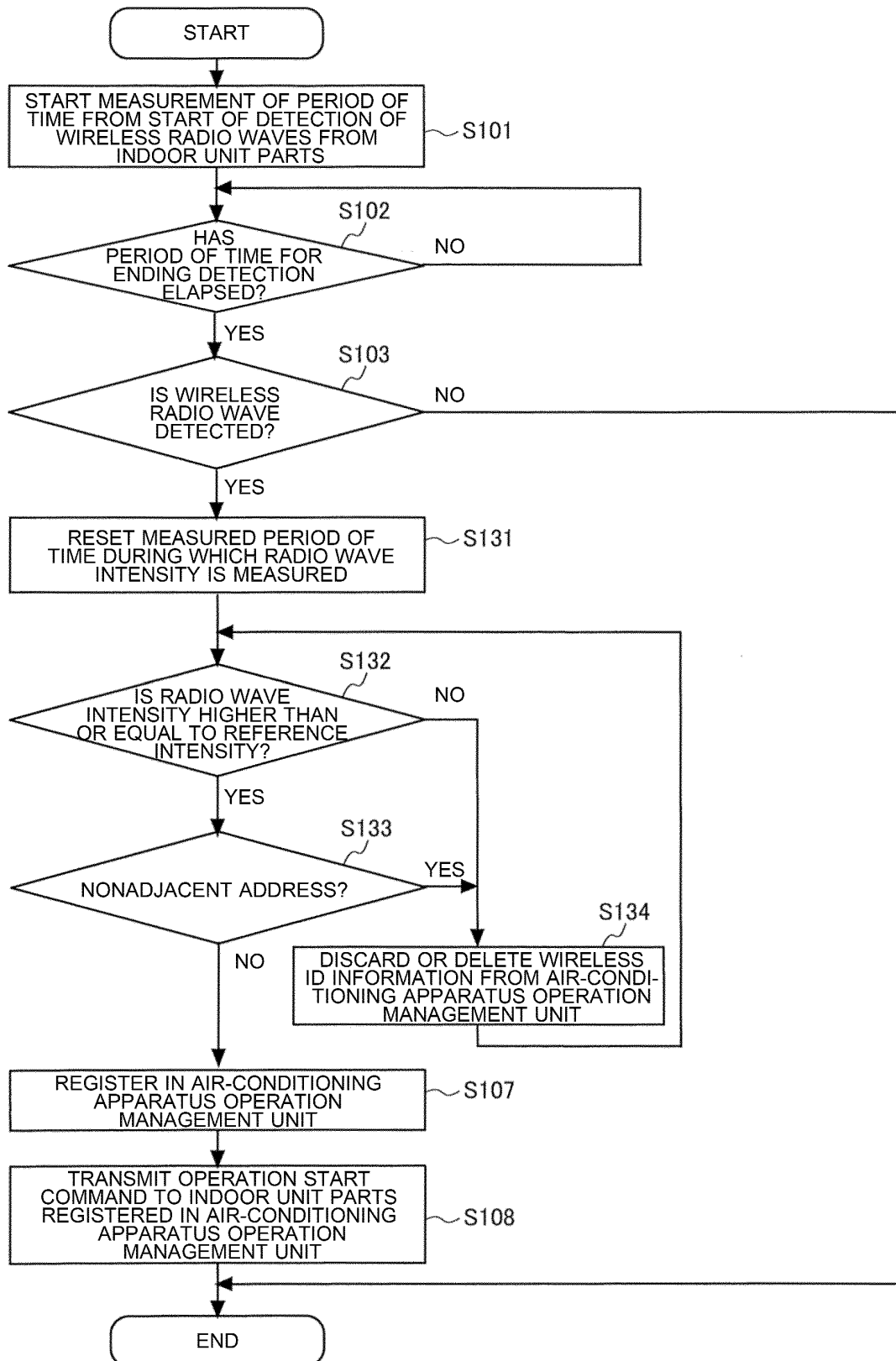
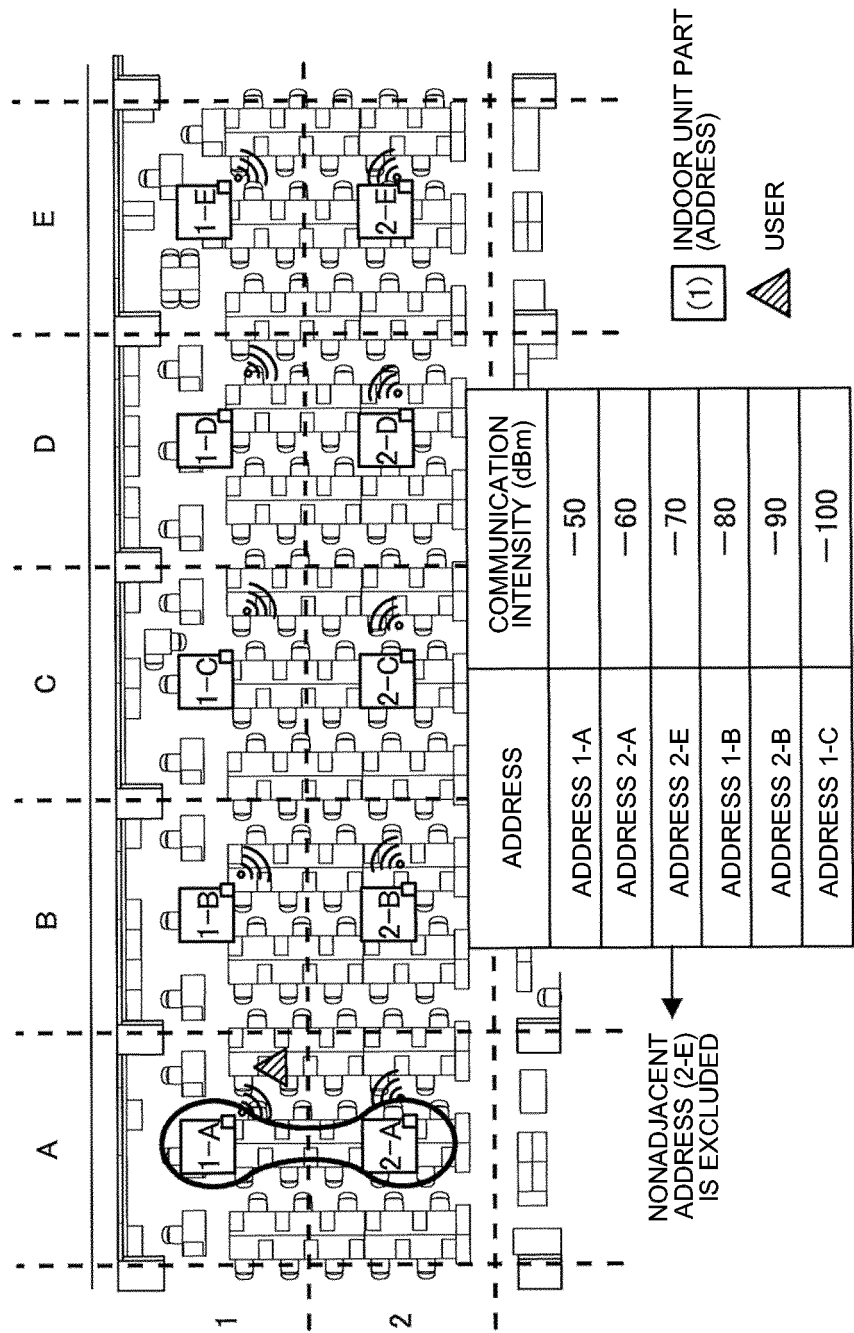


FIG. 15



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/036579

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. F24F11/54(2018.01)i, F24F11/52(2018.01)i, F24F11/56(2018.01)i,
F24F11/64(2018.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. F24F11/54, F24F11/52, F24F11/56, F24F11/64

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2018

Registered utility model specifications of Japan 1996-2018

Published registered utility model applications of Japan 1994-2018

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2015/111173 A1 (MITSUBISHI ELECTRIC CORPORATION) 30 July 2015, paragraphs [0015]-[0112], fig. 1-32	1-2, 6
Y	& US 2016/0245542 A1, paragraphs [0066]-[0188], fig. 1-32 & CN 105899885 A	3-5
Y	JP 2010-121823 A (DAIKIN INDUSTRIES, LTD.) 03 June 2010, paragraphs [0006]-[0008], [0032]-[0072], fig. 1-7 & WO 2010/058542 A1	3-5
A	JP 2014-194309 A (HITACHI APPLIANCES INC.) 09 October 2014, paragraph [0004] (Family: none)	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
07.12.2018

Date of mailing of the international search report
25.12.2018

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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/036579

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*

Citation of document, with indication, where appropriate, of the relevant passages

Relevant to claim No.

A

JP 8-75230 A (SANYO ELECTRIC CO., LTD.) 19 March
1996, paragraphs [0017]-[0046], fig. 1-4
(Family: none)

1-6

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003284169 A [0006]