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### METHOD AND DEVICE FOR REGISTERING HOME APPLIANCE DEVICE IN WIRELESS COMMUNICATION SYSTEM

#### Abstract

One embodiment relates to a home appliance device, comprising: a communication unit that receives a router network profile and information related to the number of devices to be registered from a mobile terminal on which an application is installed; and a control unit that controls transmission of information instructing at least one first home appliance device to act as a bridge host and the router network profile to the at least one first home appliance device, and controls transmission of information instructing at least one second home appliance device to act as a bridge guest and transmission of the network profile of the bridge host to at least one second home appliance device, wherein the communication unit comprises a WiFi Bluetooth Low Energy (BLE) device that transmits and receives signals on the basis of a BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device, the router network profile is used when the at least one first home appliance device connects to the router, and the bridge host network profile is used when the at least one second home appliance device connects to the bridge host.

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## Background/Summary

### TECHNICAL FIELD

[0001] The following description relates to a method and device for registering multiple home appliance devices at once.

### BACKGROUND ART

[0002] Recently, with the popularization of mobile terminals such as smartphones and the development of IoT (Internet of Things) technology, home appliances with communication functions have rapidly come into widespread use.

[0003] Home appliances with communication functions may be connected to a server or a mobile terminal through an access point (AP) such as a router in a home. In addition, a user may conveniently check the status of a home appliance through a mobile terminal and remotely control the operation of the home appliance. Furthermore, a user may easily perform device registration for a home appliance through a mobile terminal.

[0004] A conventional method for registering a home appliance with a server has been configured to receive main information of the device through device-to-device wired communication. For example, as illustrated in FIG. 1, in order to simultaneously register devices such as wash towers, the conventional method may receive the main information of the devices through device-to-device wired communication, and up to two devices can be registered simultaneously in the server. However, this conventional method has the problem that registration is not possible without a wired connection between devices due to transmission of main information via wired connection, and both devices are included as the number of STAs (stations) in the router, so that performance of the router may be problematic.

### DISCLOSURE

#### Technical Problem

[0005] An object of the present disclosure is to provide a method and device for collectively registering multiple home appliance devices based on grouping and Bluetooth low energy (BLE) concurrency.

#### Technical Solutions

[0006] In accordance with an aspect of the present disclosure, a home appliance device may include: a communication unit configured to receive information related to an access point (AP) network profile and information related to the number of devices to be registered from a mobile terminal in which an application is installed; and a controller configured to transmit information instructing at least one first home appliance device to act as a bridge host and the access point (AP) network profile to the at least one first home appliance device, and to transmit information instructing at least one second home appliance device to act as a bridge guest and the bridge host

network profile to the at least one second home appliance device, wherein the communication unit includes a Wi-Fi Bluetooth low energy (BLE) device configured to process signal communication based on a BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device; and the access point (AP) network profile is used when the at least one first home appliance device is connected to the access point (AP), and the bridge host network profile is used when the at least one second home appliance device is connected to the bridge host.

[0007] In accordance with another aspect of the present disclosure, a method for registering a home appliance device may include: receiving information related to an access point (AP) network profile and information related to the number of devices to be registered from a mobile terminal in which an application is installed; and transmitting information instructing at least one first home appliance device to act as a bridge host and the access point (AP) network profile; and transmit information instructing at least one second home appliance device to act as a bridge guest and the bridge host network profile to the at least one second home appliance device, wherein a Wi-Fi Bluetooth low energy (BLE) device of the home appliance device is configured to process signal communication based on a BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device; and the access point (AP) network profile is used when the at least one first home appliance device is connected to the access point (AP), and the bridge host network profile is used when the at least one second home appliance device is connected to the bridge host.

[0008] The controller may receive a device information request from the mobile terminal, may check the number of registrable devices that can be registered, may transmit information related to the number of devices that can be registered and information related to the home appliance device, and may perform an authentication procedure.

[0009] The Wi-Fi BLE device may be configured to operate based on a time-division operation between a first logical interface related to signal communication related to registration between the home appliance device and the application and a second logical interface related to signal communication between the home appliance device and the at least one first home appliance device.

[0010] The home appliance device may be connected to an access point (AP) using the access point (AP) network profile.

[0011] A maximum number of the first home appliance devices may be 4, and a maximum number of the second home appliance devices may be 3.

[0012] The information related to the number of devices to be registered may be information input through an interface of the mobile terminal.

[0013] The bridge host may be determined in ascending numerical order of received signal strength indicators (RSSI) among the plurality of home appliance devices.

[0014] The bridge guest may correspond to a home appliance device having a received signal strength indicator (RSSI) similar to the RSSI of the bridge host.

[0015] The home appliance may be one of a shoe styler, a washing machine, and a refrigerator.

[0016] The at least one first home appliance device may be registered with a server via the access point (AP), and the at least one second home appliance device may be registered with the server via the bridge host.

#### Advantageous Effects

[0017] As is apparent from the above description, the embodiments of the present disclosure can collectively (simultaneously) register a plurality of home appliance devices through a single registration procedure. In addition, multiple home appliance devices can be prevented from being considered as stations (STAs) through grouping, thereby preventing degradation of router (or AP) performance.

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## Description

### DESCRIPTION OF DRAWINGS

[0018] The accompanying drawings, which are included to provide a further understanding of the disclosure and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the disclosure and together with the description serve to explain the principle of the disclosure.

In the drawings:

[0019] FIG. 1 is a diagram illustrating a conventional method for registering a home appliance into a server according to the related art.

[0020] FIG. 2 is a conceptual diagram illustrating a home appliance control system for providing a home appliance control service according to an embodiment of the present disclosure.

[0021] FIG. 3 is a block diagram illustrating the home appliances shown in FIG. 2.

[0022] FIG. 4 is a flowchart illustrating a method for registering a home appliance device according to an embodiment of the present disclosure.

[0023] FIG. 5 is an example of a network configuration when a connection is completed.

[0024] FIGS. 6 and 7 are flowcharts according to an embodiment of the present disclosure.

[0025] FIG. 8 is a diagram illustrating a Wi-Fi BLE device according to an embodiment of the present disclosure.

### BEST MODE

[0026] In various embodiments of the present disclosure, “/” and “,” should be interpreted as “and/or”. For example, “A/B” may mean “A and/or B”. Further, “A, B” may mean “A and/or B”. Further, “A/B/C” may mean “at least one of A, B and/or C”. Further, “A, B, C” may mean “at least one of A, B and/or C”.

[0027] In various embodiments of the present disclosure, “or” should be interpreted as “and/or”. For example, “A or B” may include “only A”, “only B”, and/or “both A and B”. In other words, “or” should be interpreted as “additionally or alternatively”.

[0028] Hereinafter, a home appliance control system according to an embodiment of the present disclosure will be described with reference to FIG. 2.

[0029] FIG. 2 is a conceptual diagram illustrating a home appliance control system for providing a home appliance control service according to an embodiment of the present disclosure.

[0030] Referring to FIG. 2, the home appliance control system may correspond to a system that provides a service for remotely controlling home appliances (10a, 10b) in a home through a mobile terminal 20.

[0031] Such a home appliance control system may include at least one home appliance (10a, 10b), a mobile terminal 20, an access point (AP) 30 serving as a router, and a server 40.

[0032] At least one home appliance (10a, 10b; inclusively 10) is a device that is installed in a space such as a home and performs various operations. FIG. 2 illustrates a shoe styler as an example of at least one home appliance (10a, 10b), but the type and number of home appliances are not limited thereto.

[0033] The mobile terminal 20 may include a terminal that a user can carry while moving, such as a smartphone, a tablet computer, a smart watch, smart glasses, etc.

[0034] Meanwhile, depending on the embodiment, the home appliance control system may include not only a mobile terminal but also a fixed terminal such as a PC.

[0035] An application for using a service provided by the home appliance control system according to the embodiment of the present disclosure may be installed in the mobile terminal 20. The user may remotely control the operation of the home appliance (10a, 10b) in the home or remotely check the status of the home appliance (10a, 10b) through the application installed in the mobile terminal 20. The application may be installed on a personal computer (PC) or other home appliance as well as the mobile terminal.

[0036] Meanwhile, the user may register the home appliance (**10a**, **10b**) with the server **40** in order to use the service provided by the home appliance control system. At this time, the user may register the home appliance (**10a**, **10b**) with the server **40** using the mobile terminal **20**.

[0037] The AP **30** serving as a router can communicate and connect the home appliance (**10a**, **10b**) with the server **40**. For example, the home appliance (**10a**, **10b**) may include a Wi-Fi BLE (Bluetooth Low Energy) device that supports Wi-Fi wireless communication, and can be connected to the AP **30** through the Wi-Fi device. This AP **30** may correspond to a router or AP that is generally provided at home.

[0038] The server **40** is a device that provides a home appliance control service and can be managed by a manufacturer or a service provider. The server **40** may store information about each user who uses the service. For example, information about each user may include a user account, terminal information, AP (router) information, registered home appliance information, etc.

[0039] When the server **40** receives a control command for a specific home appliance (e.g., shoe styler **10b**) from a mobile terminal **20**, the server **40** can transmit the received control command to the shoe styler **10b** through the AP **30**. At this time, the shoe styler **10b** may operate based on the received control command.

[0040] FIG. **3** is a block diagram illustrating the home appliances shown in FIG. **2**.

[0041] Referring to FIG. **2**, the home appliance **10a** may include a communication unit **110a**, an input unit **120a**, an output unit **130a**, a drive unit **140a**, a memory **150a**, and a controller **160a**. However, some of the configurations of the home appliance **10a** illustrated in FIG. **2** may be added or omitted depending on the type of the home appliance **10a**.

[0042] The communication unit **110a** may include at least one communication device for connecting the home appliance **10a** to the AP (router) **30** or a pre-registered home appliance **10b**. For example, the communication unit **110a** may include a Wi-Fi BLE device **112a** supporting Wi-Fi wireless communication, and a short-range communication device **114a** such as NFC (near field communication).

[0043] The Wi-Fi BLE device **112a** may operate in either an AP (router) mode or a station (STA) mode under control of the controller **160a** or a microcomputer within the Wi-Fi BLE device **112a**.

[0044] The AP mode may be a mode in which a connection between a peripheral device and the home appliance **10a** is established by connecting another peripheral device (e.g., another peripheral home appliance, etc.) to the Wi-Fi BLE device **112a**. On the other hand, the STA (station) mode may be a mode in which a connection between the home appliance **10a** and the AP **30** is established by connecting the Wi-Fi BLE device **112a** to the AP **30**.

[0045] The input unit **120a** may include at least one input means for a user to input a predetermined signal or data into the home appliance **10a**. For example, the at least one input means may include a button, a dial, a touchpad, a microphone, etc.

[0046] Meanwhile, the input unit **120a** may include an interface connected to a remote control device (not shown). That is, the input unit **120a** may receive a control signal from the remote control device through the interface.

[0047] The output unit **130a** may include an output means for informing the user of various information related to the operation of the home appliance **10a**. For example, the output unit **130a** may include a display or an optical output unit as a graphic or text output means, and may include a speaker or a buzzer as an audio output means.

[0048] The drive unit **140a** is a configuration that performs an operation related to a function provided by the home appliance **10a**, and may be different depending on the type of the home appliance **10a**. For example, if the home appliance **10a** is a washing machine, the drive unit **140a** may include a drum motor, a water supply device, etc.

[0049] In the memory **150a**, various data such as various algorithms for the operation of the home appliance **10a**, control data for controlling the home appliance **10a**, data for determining whether an error has occurred in the home appliance **10a**, and a hidden SSID list can be stored.

[0050] The controller **160a** may control the overall operation of the home appliance **10a**. The controller **160a** may control the drive unit **140a** based on a control command or a function execution command input by the user. The controller **160a** may include at least one CPU, a microcomputer, a processor, an integrated circuit (IC), etc.

[0051] Meanwhile, in order to control the home appliance **10a** through the service provided by the home appliance control system of FIG. 2, the user must register information about the home appliance **10a** with the server **40**.

[0052] In order to register information about the home appliance **10a** with the server **40**, a communication connection must be established between the home appliance **10a** and the server **40**. To this end, the Wi-Fi BLE device **112a** of the home appliance **10a** can be connected to the server **40** through the AP **30** by connecting to the AP **30** serving as the router.

[0053] In order for a home appliance **10a** to connect to the AP **30**, the home appliance **10a** must obtain information about the AP **30**. Generally, a user may receive information about the AP **30** from the home appliance **10a** through the mobile terminal **20**.

[0054] Meanwhile, according to an embodiment of the present disclosure, the Wi-Fi BLE device **112a** of the home appliance **10a** may be implemented to have at least one virtual interface. Accordingly, the home appliance **10a** can be connected to two devices simultaneously through the Wi-Fi BLE device **112a** having at least one virtual interface.

[0055] At least one virtual interface is a virtual interface added by time-sharing one physical Wi-Fi interface, so that the Wi-Fi BLE device **112a** can perform a communication function as if two physical Wi-Fi interfaces are operating through this at least one virtual interface.

[0056] Through this, the home appliance **10a** can be connected to the pre-registered home appliance **10b**, may acquire information about the AP **30**, and may attempt to connect to the AP **30** while maintaining the connection with the pre-registered home appliance **10b**.

[0057] Here, information about the AP **30** may include a service set identifier (SSID) and password of the AP **30**.

[0058] Of course, the home appliance **10a** may not use at least one virtual interface when attempting to connect to the AP **30**. That is, the home appliance **10a** may be connected to the pre-registered home appliance **10b**, may obtain information about the AP **30**, may terminate the connection with the pre-registered home appliance **10b**, and may then attempt to connect to the AP **30**.

[0059] For reference, when a connection (i.e., communication) between the home appliance **10a** and the pre-registered home appliance **10b** is performed, an authentication process may be performed through a certificate-based server for security. That is, the communication between the home appliance **10a** and the pre-registered home appliance **10b** may be performed through a secure channel (e.g., a communication channel used by the pre-registered home appliance **10b**).

[0060] Based on the above-described content, the home appliance device according to one embodiment of the present disclosure may include a communication unit and the controller. The communication unit may receive an AP network profile and information related to the number of devices to be registered from a mobile terminal in which an application is installed. The controller may control at least one first home appliance device to transmit information instructing a role of a bridge host and the AP network profile, and may control at least one second home appliance device to transmit information instructing a role of a bridge guest and the bridge host network profile. The home appliance device, the first home appliance device, and the second home appliance device may all be shoe stylers. Alternatively, the home appliance device, the first home appliance device, and the second home appliance device may be home appliances such as a refrigerator and a washing machine, and may also be composed of different types of home appliances.

[0061] Here, the communication unit may include a Wi-Fi BLE (Bluetooth Low Energy) device that processes signal communication based on a BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least

one second home appliance device. Specifically, the Wi-Fi BLE device included in the home appliance device may operate based on a time-division operation between a first logical interface (or virtual interface) related to signal communication related to registration between the home appliance device and the application and a second logical interface related to signal communication between the home appliance device and the at least one first home appliance device. In other words, the home appliance device and the application may transmit and receive signals through the first logical interface, and the home appliance device and the first home appliance device may transmit and receive signals through the second logical interface, and the first logical interface and the second logical interface may be used by time-dividing the physically single Wi-Fi BLE device. Likewise, the home appliance device and the second home appliance device may transmit and receive signals through a third logical interface, and the third logical interface can also be seen as using the Wi-Fi BLE device based on time division. The home appliance device performing the above function can correspond to a master device.

[0062] The above AP network profile may be used when the at least one first home appliance device is connected to the AP serving as the router, and the above bridge host network profile may be used when the at least second home appliance device is connected to the bridge host.

[0063] In addition, the controller may receive a device information request from the mobile terminal, may check the number of registerable devices, may transmit information related to the number of registerable devices and information related to the home appliance device, and may perform the authentication procedure.

[0064] The Wi-Fi BLE device may operate based on a time-division operation between a first logical interface related to signal communication related to registration between the home appliance device and the mobile terminal and a second logical interface related to signal communication between the home appliance device and the at least one first home appliance device.

[0065] The home appliance device may be connected to the AP using the AP network profile. In addition, the at least one first home appliance device may be registered with a server via the AP, and the at least one second home appliance device may be registered with the server via the bridge host.

[0066] The at least one first home appliance device may be connected to the AP using the AP network profile, and the at least one second home appliance device may be connected to the bridge host using the bridge host network profile. The above home appliance device may be connected to the AP using the AP network profile. The at least one first home appliance device can be registered with a server via the AP, and the at least one second home appliance device can be registered with the server via the bridge host.

[0067] That is, it is possible to select a representative device of a bridge host by grouping four groups such that four devices can be directly connected to the AP and at the same time provide a hotspot function. As a result, the remaining devices in the group can provide network services. Here, the number of the first home appliance devices can be up to 4, and the number of the second home appliance devices can be up to 3. However, this is merely an example, and the number of devices can be expanded/changed. FIG. 5 illustrates an example of a network configuration when the connection is completed in this manner. Referring to FIG. 5, each of four bridge master devices may be connected to the AP, and three bridge guest devices may be connected to each bridge master device.

[0068] Hereinafter, a method for registering the home appliance device based on the above description will be described in detail. FIG. 4 illustrates a flowchart related to a method for registering a home appliance device according to an embodiment of the present disclosure. However, this is merely an example, and steps supported by the entire contents of the present disclosure may be added or specific steps may be excluded. In addition, the order of each step is an example, and the order of each step may be changed as needed.

[0069] Referring to FIG. 4, the home appliance device may receive information related to the AP network profile and the number of devices to be registered from the mobile terminal in which an application is installed. Information instructing at least one first home appliance device to act as a bridge host and the AP network profile can be transmitted to the at least one first home appliance device. In addition, information instructing at least one second home appliance device to act as a bridge guest and the bridge host network profile can be transmitted to the at least one second home appliance device.

[0070] Here, the Wi-Fi BLE device of the home appliance may process signal communication based on the BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device.

[0071] The at least one first home appliance device may be connected to the AP using the AP network profile, and the at least one second home appliance device may be connected to the bridge host using the bridge host network profile. The home appliance device may be connected to the AP using the AP network profile. The at least one first home appliance device may be registered with the server through the AP, and the at least one second home appliance device may be registered with the server through the bridge host.

[0072] The method may further include, as illustrated in FIGS. 6A to 6D, receiving a device information request from the application (S601); checking the number of devices that can be registered (S602); transmitting information related to the number of devices that can be registered and information related to the home appliance device (S603); and performing the authentication procedure (S605 to S606). The information related to the number of devices to be registered may be information input through the interface of the user equipment (UE). In FIGS. 6A to 6D, ThinQServer may correspond to the server described above, ThinQapp may correspond to an application, SHOECASE\_MASTER may correspond to a master device, SHOECASE\_BRIDGE\_HOST may correspond to a bridge host device, and SHOECASE\_BRIDGE\_GUEST may correspond to a bridge guest device.

[0073] In step S605, as described above, the master device may receive information related to the AP network profile and the number of devices to be registered from the application.

[0074] In step S631, the master device may transmit information instructing a bridge host role and the AP network profile to at least one or more first home appliance devices. Through the illustrated steps, the first home appliance device may perform registration with the AP and the server using the AP network profile.

[0075] In step S651, the master device may transmit information instructing a bridge guest role and the bridge host network profile to at least one second home appliance device. Through the illustrated process, the second home appliance device may perform registration with the bridge host using the bridge host network profile, and may perform registration with the router and the server through the bridge host.

[0076] In this way, the registration procedure of the bridge host device can be performed for up to four devices, and the registration procedure of the bridge guest device can be performed for up to three devices. This repeated registration sequence will be described with reference to FIGS. 7A to 7D.

[0077] FIG. 8 illustrates the Wi-Fi BLE device according to an embodiment of the present disclosure. As described above, the Wi-Fi BLE device of FIG. 8 can process signal communication based on the BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device. That is, as illustrated in FIG. 8, the Wi-Fi BLE device can communicate with a mobile phone application (App) through the BLE concurrency function and simultaneously perform inter-product communication. The Wi-Fi bridge mode means a function that operates as a Wi-Fi station and also operates in the Wi-Fi AP mode at the same time, so that other products are connected to its own AP mode and provide Internet services. The multiple product registration task refers to a task that



performs network configuration through inter-product communication, etc. according to the roles of the master, the bridge host, and the bridge guest in order to register products.

[0078] The home appliance may be a home appliance including a Wi-Fi BLE device. For example, the home appliance may be one of home appliances such as a shoe styler, a washing machine, a refrigerator, etc.

## INDUSTRIAL APPLICABILITY

[0079] The above-described embodiments of the present disclosure are applicable to various mobile communication systems.

## Claims

1. A home appliance device comprising: a communication unit configured to receive information related to an access point (AP) network profile and information related to the number of devices to be registered from a mobile terminal in which an application is installed; and a controller configured to transmit information instructing at least one first home appliance device to act as a bridge host and the access point (AP) network profile to the at least one first home appliance device, and to transmit information instructing at least one second home appliance device to act as a bridge guest and the bridge host network profile to the at least one second home appliance device, wherein the communication unit includes a Wi-Fi Bluetooth low energy (BLE) device configured to process signal communication based on a BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device; and the access point (AP) network profile is used when the at least one first home appliance device is connected to the access point (AP), and the bridge host network profile is used when the at least one second home appliance device is connected to the bridge host.
2. The home appliance device according to claim 1, wherein the controller is configured to: receive a device information request from the mobile terminal; check the number of registrable devices that can be registered; transmit information related to the number of devices that can be registered and information related to the home appliance device; and perform an authentication procedure.
3. The home appliance device according to claim 1, wherein: the Wi-Fi BLE device is configured to operate based on a time-division operation between a first logical interface related to signal communication related to registration between the home appliance device and the application and a second logical interface related to signal communication between the home appliance device and the at least one first home appliance device.
4. The home appliance device according to claim 1, wherein: the home appliance device is connected to an access point (AP) using the access point (AP) network profile.
5. The home appliance device according to claim 1, wherein: a maximum number of the first home appliance devices is 4, and a maximum number of the second home appliance devices is 3.
6. The home appliance device according to claim 1, wherein: the information related to the number of devices to be registered is information input through an interface of the mobile terminal.
7. The home appliance device according to claim 1, wherein: the bridge host is determined in ascending numerical order of received signal strength indicators (RSSI) among the plurality of home appliance devices.
8. The home appliance device according to claim 7, wherein: the bridge guest corresponds to a home appliance device having a received signal strength indicator (RSSI) similar to the RSSI of the bridge host.
9. The home appliance device according to claim 1, wherein: the home appliance is one of a shoe styler, a washing machine, and a refrigerator.
10. The home appliance device according to claim 1, wherein: the at least one first home appliance device is registered with a server via the access point (AP); and the at least one second home appliance device is registered with the server via the bridge host.

**11.** A method for registering a home appliance device comprising: receiving information related to an access point (AP) network profile and information related to the number of devices to be registered from a mobile terminal in which an application is installed; and transmitting information instructing at least one first home appliance device to act as a bridge host and the access point (AP) network profile; and transmit information instructing at least one second home appliance device to act as a bridge guest and the bridge host network profile to the at least one second home appliance device, wherein a Wi-Fi Bluetooth low energy (BLE) device of the home appliance device is configured to process signal communication based on a BLE concurrency function among the home appliance device, the mobile terminal, the at least one first home appliance device, and the at least one second home appliance device; and the access point (AP) network profile is used when the at least one first home appliance device is connected to the access point (AP), and the bridge host network profile is used when the at least one second home appliance device is connected to the bridge host.

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