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Electronic device for performing encrypted communication, and operation method thereof

Abstract

Electronic devices are disclosed, including a first and second device. The first device includes a communication circuit, and a processor. The processor is configured to receive a first signal from the second device, identify a present mode of the second device, based on the received first signal, establish a communicative connection with the second device, based on identifying that the second device is operating in a first mode, in response to establishing the connection, generate first information for inclusion in a second signal to be periodically transmitted from the second device which transitions to a second mode, and second information for encrypting communications with the second device, and transmit the first information and the second information to the second device, and a second device different from the second device.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION(S) (1) This application is continuation of International Application No. PCT/KR2020/014926, filed on Oct. 29, 2020, which claims priority to Korean Patent Application No. 10-2019-0135901 filed on Oct. 29, 2019 in the Korean Intellectual Property Office, the disclosures of which are herein incorporated by reference.

BACKGROUND
Technical Field
(1) Certain embodiments of the disclosure relate to remote access and control of external electronic devices, and, more particular, to adding encrypted security to the remote access and control operations.
Description of Related Art
(2) Portable digital communication devices have become a necessity for contemporary consumers. Consumers desire access to a variety of high-quality digital services, with portable allowing access to those services irrespective of time or location.
(3) A device control service using short-range communication may allow portable digital communication devices to control other devices located within a specified distance range. In order to provide the device control service, the portable digital communication devices may include communication circuits for short-range communication with other devices, and may thus control the communication circuits to transceive data with the other devices.
(4) To ensure the device control service has a sufficient degree of security, it is desirable to implement access right control when performing short-range communications with other devices.
(5) To control a target device (e.g., such as a BLE device) or identify a state of the target device, other electronic devices may be in communication with the target device. The target device may be in communication so as to be controlled by the connected electronic devices, thereby providing remote access to a particular service (e.g., activation or deactivation of lighting) for a user of the electronic device(s). However, because the target device is indiscriminately controlled by various electronic devices, some or all of which may actually be unauthorized to access the target device, a problem may occur in that the target device does not operate as intended by the authorized user of the target device. Moreover, since information related to the target device is transceived indiscriminately by various electronic devices (including unauthorized devices), there is a risk of exposing the user's information to illicit access.
(6) In addition, when an access right to the target device is actively restricted, establishing control of the target device may involve determining security authorization for each accessing device, thereby increasing operational load. In particular, when the target device supports short-range communication without supporting long-range communication (e.g., Internet communication), protocols for sharing secure information of the target device with accessing devices may be non-extant or underdeveloped.
SUMMARY
(7) According to certain embodiments, an electronic device may generate information indicating whether the electronic device is authorized to control a target device, and communicably connect to the target device based on the generated information, thereby preventing the target device from operation by unauthorized controller devices. Further, according to certain embodiments, the electronic device may establish encryption for the target device, and encrypt transceived data for

the target device based on the information, thereby increasing security of information for remote control of the target device. Further, according to certain embodiments, as the electronic device limits the granting of access rights to the target device to electronic devices of other authorized controllers, operational loads for establishing such control may be reduced.

(8) According to certain embodiments, an electronic device includes: a communication circuit; a memory configured to store instructions; and at least one processor communicatively coupled to the communication circuit and the memory, wherein the instructions are executable by the at least one processor to cause the electronic device to: receive a first signal from a first external device, via the communication circuit, identify a present mode of the first external device, based on the received first signal, control the communication circuit to establish a communicative connection with the first external device, based on identifying that the first external device is operating in a first mode, in response to establishing the connection, generate first information for inclusion in a second signal to be periodically transmitted from the first external device operating in a second mode, and second information for encrypting communications with the first external device, and control the communication circuit to transmit the first information and the second information to the first external device, and a second external device different from the first external device.

(9) According to certain embodiments, an electronic device includes: processor communicatively coupled to the communication circuit and the memory, wherein the instructions are executable by the at least one processor to cause the electronic device to: control the communication circuit to periodically transmit a first signal, connect to a first external device, via the communication circuit, based at least in part on the transmitted first signal, receive first information and second information for encrypted communication from the connected first external device via the communication circuit, periodically transmit a second signal including the first information, based on the received first information and second information, establishing a connection to a second external device, based on the transmitted second signal, via the communication circuit, and transceive data with the connected first external device, based on the second information.

(10) According to certain embodiments, an electronic device may include a communication circuit, a memory configured to store instructions, and at least one processor configured to execute the instructions stored in the memory. The instructions may be configured to cause the at least one processor to control the communication circuit to periodically transmit a first signal, control the communication circuit to connect to a first external device based on the transmitted first signal, control the communication circuit to receive first information, and second information for encrypted communication from the connected first external device, control the communication circuit to periodically transmit a second signal including the first information, based on the receiving the first information and the second information, control the communication circuit to connect to a second external device located within a specified distance, based on the transmitted second signal, and control the communication circuit to transmit data to or receive data from the connected first external device based on the second information.

(11) According to certain embodiments, the technical solutions are not limited to the above-described solutions, and those skilled in the art will clearly understand solutions not mentioned from the specification and the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a block diagram illustrating an electronic device in a network environment according to certain embodiments.

(2) FIG. **2** is a diagram illustrating an example system according to certain embodiments.

(3) FIG. **3** is a flowchart illustrating an example of operations of devices included in the system

according to certain embodiments.

(4) FIG. **4** is a diagram illustrating an example of operations of devices included in the system according to certain embodiments.

(5) FIG. **5** is a flowchart illustrating another example operation of the system according to certain embodiments.

(6) FIG. **6** is a diagram illustrating another example operation of the system according to certain embodiments.

(7) FIG. **7**A is a diagram illustrating an example operation of registering information generated based on pairing with a target device in a server in an electronic device according to certain embodiments.

(8) FIG. **7**B is a diagram illustrating an example of accounts and categories in which first information and/or second information is registered according to certain embodiments.

(9) FIG. **8** is a flowchart illustrating an example operation of randomly generating first information and/or second information in an electronic device according to certain embodiments.

(10) FIG. **9** is a diagram illustrating an example operation of randomly generating first information and/or second information in an electronic device according to certain embodiments.

(11) FIG. **10** is a flowchart illustrating an example operation of displaying information related to a target device in an electronic device according to certain embodiments.

(12) FIG. **11** is a diagram illustrating an example operation of displaying information related to a target device in an electronic device according to certain embodiments.

(13) FIG. **12** is a flowchart illustrating an example operation of establishing a communication connection with a target device based on additional information in an electronic device according to certain embodiments.

(14) FIG. **13** is a diagram illustrating an example operation of establishing a communication connection with a target device based on additional information in an electronic device according to certain embodiments.

(15) FIG. **14** is a flowchart illustrating an example operation of a target device according to certain embodiments.

(16) FIG. **15** is a diagram illustrating an example operation of a target device according to certain embodiments.

(17) FIG. **16** is a diagram illustrating another example operation of a target device according to certain embodiments.

(18) FIG. **17** is a flowchart illustrating an example reset operation of a target device according to certain embodiments.

(19) FIG. **18** is a diagram illustrating an example reset operation of a target device according to certain embodiments.

(20) FIG. **19** is a flowchart illustrating another example operation of the system according to certain embodiments.

(21) FIG. **20** is a diagram illustrating another example operation of the system according to certain embodiments.

DETAILED DESCRIPTION

(22) FIG. **1** is a block diagram illustrating an electronic device **101** in a network environment **100** according to certain embodiments. Referring to FIG. **1**, the electronic device **101** in the network environment **100** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). According to an embodiment, the electronic device **101** may communicate with the electronic device **104** via the server **108**. According to an embodiment, the electronic device **101** may include a processor **120**, memory **130**, an input device **150**, a sound output device **155**, a display device **160**, an audio module **170**, a sensor module **176**, an interface **177**, a haptic module **179**, a camera module **180**, a

power management module **188**, a battery **189**, a communication module **190**, a subscriber identification module (SIM) **196**, or an antenna module **197**. In some embodiments, at least one (e.g., the display device **160** or the camera module **180**) of the components may be avoided from the electronic device **101**, or one or more other components may be added in the electronic device **101**. In some embodiments, some of the components may be implemented as single integrated circuitry. For example, the sensor module **176** (e.g., a fingerprint sensor, an iris sensor, or an illuminance sensor) may be implemented as embedded in the display device **160** (e.g., a display).

(23) The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. According to an embodiment, as at least part of the data processing or computation, the processor **120** may load a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. According to an embodiment, the processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), and an auxiliary processor **123** (e.g., a graphics processing unit (GPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. Additionally or alternatively, the auxiliary processor **123** may be adapted to consume less power than the main processor **121**, or to be specific to a specified function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

(24) The auxiliary processor **123** may control at least some of functions or states related to at least one component (e.g., the display device **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active state (e.g., executing an application). According to an embodiment, the auxiliary processor **123** (e.g., an image signal processor or a communication processor) may be implemented as part of another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**.

(25) The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

(26) The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

(27) The input device **150** may receive a command or data to be used by other component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input device **150** may include, for example, a microphone, a mouse, a keyboard, or a digital pen (e.g., a stylus pen).

(28) The sound output device **155** may output sound signals to the outside of the electronic device **101**. The sound output device **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record, and the receiver may be used for an incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.

(29) The display device **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display device **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an embodiment, the display device **160** may include touch circuitry adapted to detect a touch, or sensor circuitry (e.g., a pressure sensor) adapted to measure the intensity of force incurred by the touch.

(30) The audio module **170** may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module **170** may obtain the sound via the input device **150**, or output the sound via the sound output device **155** or a headphone of an external electronic device (e.g., an electronic device **102**) directly (e.g., wiredly) or wirelessly coupled with the electronic device **101**.

(31) The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

(32) The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the electronic device **102**) directly (e.g., wiredly) or wirelessly. According to an embodiment, the interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

(33) A connecting terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). According to an embodiment, the connecting terminal **178** may include, for example, a HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

(34) The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.

(35) The camera module **180** may capture a still image or moving images. According to an embodiment, the camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.

(36) The power management module **188** may manage power supplied to the electronic device **101**. According to an embodiment, the power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).

(37) The battery **189** may supply power to at least one component of the electronic device **101**. According to an embodiment, the battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.

(38) The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device via the first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or the second network **199** (e.g., a long-range communication network, such as a cellular network, the Internet, or a computer network (e.g., LAN or wide area network (WAN)). These various types of

communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify and authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module **196**.

(39) The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device **101**. According to an embodiment, the antenna module **197** may include an antenna including a radiating element implemented using a conductive material or a conductive pattern formed in or on a substrate (e.g., PCB). According to an embodiment, the antenna module **197** may include a plurality of antennas. In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network **198** or the second network **199**, may be selected, for example, by the communication module **190** (e.g., the wireless communication module **192**) from the plurality of antennas. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. According to an embodiment, another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module **197**.

(40) At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

(41) According to an embodiment, commands or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. Each of the electronic devices **102** and **104** may be a device of a same type as, or a different type, from the electronic device **101**. According to an embodiment, all or some of operations to be executed at the electronic device **101** may be executed at one or more of the external electronic devices **102**, **104**, or **108**. For example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, or client-server computing technology may be used, for example.

(42) The electronic device according to certain embodiments may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, or a home appliance. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

(43) It should be appreciated that certain embodiments of the present disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements. It is to be understood that a singular form of a noun corresponding to an item may include one or more of the things, unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as "A or B," "at least one of A and B," "at least one of A or B," "A, B, or C," "at least one of A, B, and C," and "at least one of A, B, or C,"

may include any one of, or all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as "1st" and "2nd," or "first" and "second" may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is referred to, with or without the term "operatively" or "communicatively", as "coupled with," "coupled to," "connected with," or "connected to" another element (e.g., a second element), it means that the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

(44) As used herein, the term "module" may include a unit implemented in hardware, software, or firmware, and may interchangeably be used with other terms, for example, "logic," "logic block," "part," or "circuitry". A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

(45) Certain embodiments as set forth herein may be implemented as software (e.g., the program **140**) including one or more instructions that are stored in a storage medium (e.g., internal memory **136** or external memory **138**) that is readable by a machine (e.g., the electronic device **101**). For example, a processor (e.g., the processor **120**) of the machine (e.g., the electronic device **101**) may invoke at least one of the one or more instructions stored in the storage medium, and execute it, with or without using one or more other components under the control of the processor. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a complier or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. The term "non-transitory" simply means that the storage medium is a tangible device, and does not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between where data is semi-permanently stored in the storage medium and where the data is temporarily stored in the storage medium.

(46) According to an embodiment, a method according to certain embodiments of the disclosure may be included and provided in a computer program product. The computer program product may be traded as a product between a seller and a buyer. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., PlayStore™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

(47) According to certain embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities. According to certain embodiments, one or more of the above-described components may be avoided, or one or more other components may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, according to certain embodiments, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to certain embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or avoided, or one or more other operations may be added.

(48) An example of a system will be described below.

(49) According to certain embodiments, the system may include a plurality of electronic devices, at least one target device, and a server. The description of devices in the network environment **100** may be applied adaptively to the plurality of electronic devices, the at least one target device, and

the server included in the system.

(50) FIG. **2** is a diagram illustrating an example system **200** according to certain embodiments.

(51) A plurality of electronic devices **201** and **202** will be described below.

(52) According to certain embodiments, at least one of the plurality of electronic devices **201** and **202** may be connected to at least one target device **203** to identify the state of the at least one target device **203** (e.g., identify (or read) a state value of a specific service of the target device **203**) or control the state of the at least one target device **203** (e.g., change (or write) the state value of the specific service of the target device **203**).

(53) According to certain embodiments, at least one of the plurality of electronic devices **201** and **202** may control a communication circuit (e.g., a BLE communication circuit) to perform pairing with the at least one target device **203**, and generate information for encrypted communication based on performing the pairing. Further, at least one of the plurality of electronic devices **201** and **202** may directly obtain information for encrypted communication with the at least one target device **203**, which has been generated from another device, for example, from the server **204** or from another device, and perform encrypted communication to control the at least one target device **203** based on the obtained information.

(54) The at least one target device **203** will be described below.

(55) According to certain embodiments, the at least one target device **203** may be implemented to provide at least one service. For example, the at least one target device **203** may be various home appliances including a light bulb, an audio device, a refrigerator, and so on. However, without being limited to the above description, the target device **203** may be remotely controlled by another device, or may be any of various types of devices capable of providing sensed information to another device. The at least one target device **203** may include a memory, a processor, and a communication circuit to provide at least one service. Since the memory, the processor, and the communication circuit may be implemented identically to the memory, the processor, and the communication module implemented in the above-described network environment **100**, a redundant description will be omitted.

(56) According to certain embodiments, the at least one target device **203** may transmit/receive data to/from the plurality of electronic devices **201** and **202** within a short range.

(57) For example, the at least one target device **203** may include a communication circuit supporting short-range communication (hereinafter, referred to as a short-range communication circuit) as the communication circuit, and transmit/receive data to/from devices within a specified distance (e.g., a specified distance based on a short-distance communication scheme supported by the communication circuit). The short-range communication circuit may include a communication circuit supporting Bluetooth communication or a communication circuit supporting BLE communication.

(58) In addition, the at least one target device **203** may perform broadcasting, pairing, and communication connection based on a communication scheme supported by the short-range communication circuit by using the short-range communication circuit. For example, the at least one target device **203** may periodically broadcast a signal receivable at devices within the specified range from the at least one target device **203**. The at least one target device **203** may receive pairing requests from other devices, and generate information (e.g., a short-term key and a long-term key) for encryption of communication connections. That is, the at least one target device **203** may perform pairing for encryption of a communication connection before establishment of the communication connection. The at least one target device **203** may establish communication connections with the other devices after pairing, and transmit/receive encrypted data by using information for encryption of the communication connections with the other devices.

(59) According to certain embodiments, the at least one target device **203** may not include a long-range communication circuit (or long-range communication module) for establishing communication (e.g., Wifi, WLAN, and so on) with a remote electronic device. In other words, the

at least one communication circuit included in the at least one target device **203** may include a first communication circuit supporting short-range communication without a second communication circuit supporting a long-range communication circuit.

(60) According to certain embodiments, the at least one target device **203** may be set to different modes. The different modes may include a setup mode and an operation mode. The setup mode may refer to a mode in which information (e.g., an adv ID) generated based on pairing with another device is not included in a signal periodically transmitted from the at least one target device **203**. The operation mode may refer to a mode in which the information (e.g., the adv ID) generated based on the pairing with another device is included in a signal periodically transmitted from the at least one target device **203**. That is, other electronic devices may identify the mode of the at least one target device **203** according to whether a signal output from the target device **203** includes specific information.

(61) The server **204** will be described below.

(62) According to certain embodiments, the server **204** may store various types of information related to communication connections between the plurality of electronic devices **201** and **202** and the at least one target device **203**. For example, the server **204** may receive and store information generated during establishment of communication connections between at least some of the plurality of electronic devices **201** and **202** and the at least one target device **203**. The at least some of the plurality of electronic devices **201** and **202** may register the generated information in the server **204**. For example, the generated information may include information (e.g., an adv ID) for signal transmission, information (e.g., a symmetric key) for communication encryption, and various types of additional information (e.g., contextual information including location information, time information, and so on).

(63) According to certain embodiments, the server **204** may provide the stored information (e.g., the adv ID and the symmetric key) to at least some of the plurality of electronic devices **201** and **202**, which are authorized to access the stored information. For example, the server **204** may manage the information on an account basis and provide the stored information to an electronic device included in an account. In other words, information stored in association with a specific account in the server **204** is accessible to an electronic device registered in the specific account. Alternatively, the server **204** may provide information stored in association with an arbitrary account to another electronic device registered in another account allowed to share. Alternatively, the server **204** may manage information on a group basis (for a plurality of accounts) and provide the information to other electronic devices in a group. The server **204** according to certain embodiments may share registered information with an electronic device allowed to share the information, not limited to any specific sharing scheme.

(64) An example of operations of the devices included in the system **200** according to certain embodiments will be described below. A redundant description of the above-described system **200** will be omitted herein.

(65) According to certain embodiments, an electronic device (e.g., a first electronic device **201**) may generate information for communication reconnection and encrypted communication by performing pairing with the target device **203**, and transmit the generated information to another electronic device to enable the other electronic device to establish a communication connection and perform encrypted communication with the target device **203**.

(66) FIG. **3** is a flowchart **300** illustrating an example of operations of the devices included in the system **200** according to certain embodiments. According to certain embodiments, the operations of the devices included in the system **200** may be performed in an order different from the order of the operations of the devices included in the system **200** illustrated in FIG. **3**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the devices included in the system **200** illustrated in FIG. **3** may be performed. With reference to FIG. **4**, FIG. **3** will be described below.

(67) FIG. **4** is a diagram illustrating an example of operations of the devices included in the system **200** according to certain embodiments.

(68) According to certain embodiments, the first electronic device **201** (e.g., at least one processor) may control the communication circuit (e.g., the BLE communication circuit) to receive a first signal broadcast from the target device **203** in operation **301**.

(69) According to certain embodiments, the target device **203** (e.g., at least one processor) may control the communication circuit (e.g., the BLE communication circuit) to periodically broadcast the first signal (e.g., an advertisement signal), announcing the existence of the target device **203**. In this case, the target device **203** may be operating in the setup mode. The setup mode may be defined as a mode in which the target device **203** has not yet received or stored information (e.g., an advertisement (adv) ID to be described later) generated by a specific device through encrypted communication based on pairing with the specific electronic device. In other words, the setup mode may be defined as a mode in which the target device **203** periodically broadcasts a first signal that does not include information (e.g., the adv ID) generated by the specific device.

(70) According to certain embodiments, when the first electronic device **201** (e.g., the at least one processor) is located within a specified distance from the target device **203**, the first electronic device **201** may receive the first signal when it is periodically broadcast from the target device **203**. In other words, the first signal broadcast from the target device **203** may be received by electronic devices located within a specified reception range from the target device **203**.

(71) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may perform a pairing operation with the target device **203** based on the received first signal in operation **302**. For example, the first electronic device **201** may scan for pairable devices using the short-range communication circuit (e.g., the communication circuit supporting BLE communication). When the first electronic device **201** receives the first signal during the scanning, the first electronic device **201** may identify the target device **203**. For example, the first electronic device **201** may transmit a response signal (e.g., a connection request signal) corresponding to the first signal to the target device **203**, and may establish communication with the target device **203** (e.g., be paired with the device) based on the transmission/reception of the first signal and the response signal.

(72) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may identify information included in the received first signal, and identify that the target device **203** is in a first mode (e.g., the setup mode). For example, when identifying that the first signal does not include information about a specified ID (e.g., information on the adv ID), the first electronic device **201** may determine that the target device **203** is operating in the setup mode. Without being limited thereto, the first signal may include information indicating that the target device **203** is operating in the setup mode (e.g., an ID indicating that the target device **203** is operating in the setup mode). Accordingly, the first electronic device **201** may identify that the target device **203** is operating in the setup mode based on the identification of the first signal including the information indicating the setup mode.

(73) According to certain embodiments, as illustrated in **401** of FIG. **4**, the first electronic device **201** (e.g., the at least one processor) may receive **411** a device ID from the target device **203** in operation **303**, and generate first information and/or second information in operation **304**. The device ID may be information identifying the target device **203**. Operation **303** of receiving **411** the device ID from the target device by the first electronic device may be omitted, and instead, the first electronic device **201** may autonomously generate the device ID identifying the target device. For example, the first electronic device **201** may generate the device ID according to a user input. For example, in response to performing pairing with the target device **203**, the first electronic device **201** may display an interface for receiving the device ID (e.g., a nickname) identifying the target device **203**, and receive an input of the device ID from the user through the interface. Further, for example, the first electronic device **201** may generate specific information (e.g., an identification

number) as the device ID.

(74) According to certain embodiments, the first electronic device **201** may randomly generate the first information and/or the second information based on the pairing with the target device **203**. This operation will be described in detail later with reference to FIGS. **8** and **9**.

(75) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may generate the first information and/or the second information for use in controlling the target device **203** upon detecting that a specified condition is satisfied. For example, the specified condition may include at least one of the first electronic device identifying that the target device is operating in the setup mode, the first electronic device performing pairing with the target device, or the first electronic device establishing an encrypted communication connection based on the pairing with the target device. For example, the first electronic device **201** may generate the first information and/or the second information in response to identifying that the target device **203** is operating in the setup mode. In another example, the first electronic device may generate the first information and/or the second information in response to identifying that the target device **203** is operating in the setup mode and performing pairing with the target device **203**.

(76) According to certain embodiments, the first information may be information included in a second signal (e.g., an advertisement signal) periodically broadcast from the target device **203**, when the target device **203** is operating in the operation mode. Accordingly, when the other electronic device (e.g., the first electronic device **201**) receiving the second signal identifies the first information from the second signal broadcast from the target device **203**, the electronic device may identify the target device **203** and identify that the target device **203** is operating in the operation mode. In a specific example, the first information may be the adv ID.

(77) According to certain embodiments, the second information may be information facilitating encrypted communication between the target device **203** and the electronic device. In other words, the second information may be information related to implementing encrypting or decrypting data (e.g., a broadcast signal, or data transmitted/received during establishment of a communication connection) transmitted/received between the target device **203** and the electronic device communicating with the target device **203**. In a specific example, the second information may be a symmetric key.

(78) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may store **412** the generated first information and/or second information and the received device ID in the memory **211** as illustrated in **401** of FIG. **4**. In this case, the first information and/or the second information may be stored **412** in the memory **211** in association with the received device ID. That is, the first information and/or the second information stored in association with the device ID may be identified as associated with the target device **203** corresponding to the device ID. Accordingly, when the first electronic device **201** performs an operation based on the first information and/or the second information, the first electronic device **201** may identify the performed operation as an operation related to the target device **203** corresponding to the device ID associated with the first information and/or the second information, and provide information related to the performed operation based on the first information and/or the second information as an operation related to the target device **203**, when a specified condition is satisfied (e.g., a command to display information about the target device **203** is obtained). In a specific example, the first electronic device **201** may display information related to the target device **203** on a specific interface, which will be described in detail later with reference to FIGS. **10** and **11**. According to certain embodiments, in operation **305**, the first electronic device **201** (e.g., the at least one processor) may transmit **413** the first information and/or the second information to the target device **203** as illustrated in **401** of FIG. **4**. For example, the first electronic device **201** (e.g., the at least one processor) may establish a communication connection with the target device **203** based on executing pairing with the target device **203**, and transmit **413** the first information and/or the second information to the communication-connected target device **203**. In this case, the

communication connection between the first electronic device **201** and the target device **203** may be encrypted. For example, the first electronic device **201** may encrypt the first information and/or the second information based on the information (e.g., a short term key) for encryption generated based on the pairing, and transmit the encrypted first information and/or second information to the target device **203**. The target device **203** may encode the received encrypted first information and/or second information based on the information for encryption, and identify the first information and/or the second information. When the target device **203** receives the first information and/or the second information, the target device **203** may store the received first information and/or second information in the memory **213**, as illustrated in **401** of FIG. **4**.

(79) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may transmit the first information, the second information, and the device ID to a second electronic device **202** using various communication circuits (e.g., the short-range communication circuit and the long-range communication circuit) in operation **306**. For example, as illustrated in **401** of FIG. **4**, the first electronic device **201** may transmit **414** the first information, the second information, and the device ID to the second electronic device **202** via Wi-Fi-based or cellular-based communication. Further, for example, the first electronic device **201** may transmit the first information, the second information, and the device ID to the second electronic device **202** based on various short-range D2D communication or P2P communication schemes (e.g., Wi-Fi Direct, BLE, and NFC). Alternatively, when the second electronic device **202** is remote, the first electronic device **201** may transmit the first information, the second information, and the device ID to the second electronic device **202** through the Internet (e.g., through a server). The second electronic device **202** may store the received first information and second information in association with the device ID in the memory **212**.

(80) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may terminate the communication connection with the target device **203** in operation **307**. For example, as illustrated in FIG. **4**, the first electronic device **201** may move outside of a specified distance from the target device **203** permitting communication thereof, and thus the connected communication may be terminated. Further, for example, the first electronic device **201** may terminate the communication connection based on reception of a command to terminate the communication connection (e.g., a user control input for terminating the communication connection). That is, the first electronic device **201** may terminate a set-up operation of the target device **203**. The termination of the set-up operation may include termination of the established pairing with the target device and the exchange of the first information and/or the second information through encrypted communication based on the pairing. The target device **203** may operate in the operation mode in response to the termination of the set-up operation of the first electronic device **201**. Further, in response to the termination of the set-up operation of the first electronic device **201**, the target device **203** may delete any information (e.g., the short-term key) used for encryption, generated based on the pairing.

(81) According to certain embodiments, the second electronic device **202** (e.g., the at least one processor) may be located within a specified distance "d" from the target device **203** in operation **308***a*, as illustrated in **402** of FIG. **4**. In this case, the target device **203** may not establish a communication connection or perform pairing with the other electronic device. For example, after the communication connection between the target device **203** and the first electronic device **201** may be terminated as described above, the second electronic device **202** may move within the specified distance from the target device **203**.

(82) According to certain embodiments, in operation **308**, the second electronic device **202** (e.g., the at least one processor) may receive **415** a second signal (e.g., an advertisement signal) including first information broadcast from the target device **203**, as illustrated in **402** of FIG. **4**. In other words, the target device **203** may periodically broadcast the second signal (e.g., the advertisement signal) including the first information (e.g., the adv ID). The target device **203** may encrypt the first

information by using second information (e.g., a symmetric key) and periodically broadcast the second signal including the encrypted first information.

(83) According to certain embodiments, the second electronic device **202** (e.g., the at least one processor) may execute scanning based on the first information in operation **309**, and identify the target device **203** based on the executed scanning, further based on the first information in operation **310**. For example, the second electronic device **202** may execute an operation of scanning a signal including the first information based on the stored first information and second information **417**. The second electronic device **202** may identify that the received second signal includes the first information based on the scanning operation, as based on the first information. The second electronic device **202** may identify the existence of the target device **203** based on the identification of the received second signal including the first information, and identify that the target device **203** is operating in the BLE operation mode. In this case, when the first information is encrypted, the second electronic device **202** may identify the first information, by encoding the encrypted first information based on the second information stored in the second electronic device **202**.

(84) According to certain embodiments, the second electronic device **202** may perform a scanning operation based on the first information at a specified location and/or a specified time. For example, the second electronic device **202** may identify the location of the second electronic device, compare the location of the target device **203** identified based on location information about the target device **203** with the identified location of the second electronic device **202**, and when the locations correspond to each other, perform a scanning operation based on the first information. Further, for example, the second electronic device **202** may identify information regarding a time at which the target device **203** is successfully detected or a time at which control over the target device **203** is established, compare a current time with the identified time information, and when the times correspond to each other, perform the scanning operation based on the first information.

(85) Without being limited to the above description, the second electronic device **202** may perform the scanning operation based on the first information. In this case, to reduce power consumption, the second electronic device **202** may adjust a scan period based on location information or time information as described above. This operation will be described in detail later with reference to FIGS. **12** and **13**.

(86) According to certain embodiments, in operation **311**, the second electronic device **202** and the target device **203** may perform second information-based encrypted communication **416** as illustrated in **402** of FIG. **4**. For example, the second electronic device **202** may request a communication connection from the target device **203** based on the identification of the target device **203**, and control the communication circuit (e.g., the BLE communication circuit) to establish the communication connection with the target device **203** based on the request.

(87) For example, the second electronic device **202** (e.g., the at least one processor) may control the communication circuit (e.g., the BLE communication circuit) to transmit encrypted data based on the second information stored in the electronic device **202** (e.g., data of a characteristic value of a specific service, encrypted based on the second information) to the communication-connected target device **203**. In response to receiving the data transmission from the second electronic device **202** via the communication circuit (e.g., the BLE communication circuit), the target device **203** may receive the data encrypted based on the second information from the second electronic device **202**. The target device **203** may encode the data encrypted based on the second information, based on the second information stored in the target device **203**, and identify the requested control function. For example, the second electronic device **202** may encrypt a signal for controlling (e.g., writing) at least one characteristic value (or state value) (e.g., on/off) of a specific service (e.g., power) among services (e.g., BLE services) that the target device **203** (e.g., a light bulb) is capable of providing, based on the second information, and control the communication circuit (e.g., the

BLE communication circuit) to transmit the encrypted signal to the target device **203**. The target device **203** may decrypt the received encrypted signal based on the second information, and change the at least one characteristic value or setting thereof (e.g., a light on/off control) of the specific service based on the decrypted signal.

(88) For example, the second electronic device **202** (e.g., the at least one processor) may control the communication circuit (e.g., the BLE communication circuit) to receive the data encrypted based on the second information from the communication-connected target device **203**. The second electronic device **202** may decrypt the encrypted data based on the second information, and identify the state of the target device **203** based on the decrypted data. For example, the second electronic device **202** may request (or read) at least one characteristic value (or state value) (e.g., on/off) of the specific service (e.g., power) from among the services (e.g., the BLE service) provided by the target device **203** (e.g., the light bulb), and receive an encrypted signal including the at least one characteristic value from the target device **203** in response to the request. The second electronic device **202** may decrypt the encrypted signal based on the second information, identify the at least one characteristic value (or state value) of the specific service (e.g., power) (e.g., on/off) based on the decrypted signal, and as a result, provide (e.g., display on the display) the characteristic value so that the user of the second electronic device **202** may identify the identified characteristic value.

(89) After the communication connection between the first electronic device **201** and the target device **203** is terminated, as described before with reference to FIGS. **3** and **4**, the operation of performing encrypted communication with the target device **203** by the second electronic device **202** located within the specified distance from the target device **203** may also be performed, when the first electronic device **201** is re-disposed within the specified distance from the target device **203** (i.e., after the communication connection between the first electronic device **201** and the target device **203** is terminated). The re-disposed of the first electronic device **201** within the specified distance may include broad variations of contexts, such as the first electronic device **201** being moved back into the specified distance from the target device **203** a prolonged time period after the communication terminated, as well as situation in which the first electronic device **201** briefly moves outside the specified distance from the target device **203** after the communication is terminated, and then immediately re-enters the specified distance.

(90) As described above, as the target device **203** is controlled based on the first information (e.g., the adv ID) for identifying the existence of an appropriate authority to control the target device **203** and the second information (e.g., the symmetric key) for use in encrypting data transmitted and received during control of the target device, the target device **203** is controllable with security by an authorized controller. Further, as the first information and/or the second information is allowed to be shared with another device, operational load imposed by using the target device **203** for which an access authority is limited may be reduced.

(91) Another example of the operation of the system **200** according to certain embodiments will be described below. A redundant description of the above-described system **200** will be omitted herein.

(92) According to certain embodiments, an electronic device (e.g., the first electronic device **201**) may generate information for communication reconnection and encrypted communication by performing pairing with the target device **203**, and register the generated information in the server **204** so that the generated information may be transmitted to another electronic device (e.g., the second electronic device **202**).

(93) FIG. **5** is a flowchart **500** illustrating another example operation of the system **200** according to certain embodiments. According to certain embodiments, the operations of the system **200** may be performed in an order different from the operation order of the system **200** illustrated in FIG. **5**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the system **200** illustrated in FIG. **5** may be performed. FIG. **10** will be described below with reference to FIGS. **6**, 7A, and 7B.

(94) FIG. **6** is a diagram illustrating another example operation of the system **200** according to certain embodiments. FIG. **7**A is a diagram illustrating an example operation of registering information generated based on pairing with a target device to a server in an electronic device according to certain embodiments. FIG. **7**B is a diagram illustrating accounts and categories in which first information and/or second information is registered according to certain embodiments.

(95) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may receive a first signal broadcast from the target device **203** in operation **501**, perform pairing with the target device **203** in operation **502**, receive a device ID from the target device **203** in operation **503**, generate first information and/or second information based on the pairing and obtain additional information in operation **504**, and control the communication circuit (e.g., the BLE communication circuit) to transmit the generated first information and/or second information to the target device **203** in operation **505**. In other words, the first electronic device **201** may perform pairing with the target device **203** in the setup mode, generate first information (e.g., an adv ID) to be included in a signal (e.g., an advertisement signal) to be transmitted periodically from the target device **203** operating in the operation mode and second information (e.g., a symmetric key) for encrypted communication with the target device **203**, based on a result of the pairing, and provide the generated first information and/or second information to the target device **203** so that the first information and/or the second information may be stored in the target device **203**. Operations **501** to **505** of the first electronic device **201** may be performed in the same manner as the afore-described operations **301** to **305** of the first electronic device **201**, and thus a redundant description will be omitted. In this case, as in operation **303** described above, the first electronic device **201** may autonomously generate the device ID identifying the target device **203**, instead of operation **503** of receiving the device ID from the target device **203**. Alternatively, the device ID identifying the target device **203** may be generated by another external device (e.g., the server **204**), which will be described later in operation **507**.

(96) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may obtain various types of additional information based on the pairing with the target device **203**. For example, the various types of additional information may be contextual information such as time information and location information. The time information may indicate a time related to the pairing between the first electronic device **201** and the target device **203**. For example, the time information may indicate a time when the first electronic device **201** receives the first signal from the target device **203** or a time when the first electronic device **201** and the target device **203** perform pairing. The location information may indicate a location related to the first electronic device **201** or the target device **203**. For example, the location information may indicate a location at which the target device **203** is positioned (e.g., a living room, a master bedroom, or the like, when the target device **203** is provided at home) or a location at which the first electronic device **201** performs pairing with the target device **203** (e.g., a location obtained by using a GNS module/Wifi module, when the first electronic device **201** performs pairing). The additional information may be obtained using various modules (e.g., a GNS module and so on) included in the first electronic device **201** or may be input from the outside (e.g., a user input) and thus obtained. The first electronic device **201** may establish a communication connection with the target device **203** operating in the operation mode based on the obtained additional information, which will be described in detail later with reference to FIGS. **12** and **13**.

(97) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may transmit the generated first information and second information, the device ID, and various types of additional information to the server **204** in operation **506** (i.e., **602** of FIG. **6**). For example, the first electronic device **201** may control the communication circuit (e.g., various communication circuits) to transmit a message requesting registration of the first information, the second information, the device ID, and the various types of additional information to the server **204**, as illustrated in FIG. **6**. Instead of operation **506** in which the first electronic device **201**

transmits the device ID to the server **204**, the server **204** may autonomously generate the device ID, which will be described in detail later in operation **507**. The first electronic device **201** may request registration of the above-described information in a specific account from the server **204**, which will be described in detail later in operation **507**.

(98) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may perform an operation of registering the target device **203** in the setup mode based on an input received from the user. The registration of the target device **203** may include registering information related to the target device **203** in the server **204**, which may mean registration (or storage) of the first information and the second information generated based on the pairing with the target device **203**, the device ID received from the target device **203**, or the various types of additional information (e.g., the location information) in the server **204**.

(99) For example, the first electronic device **201** (e.g., the at least one processor) may identify the at least one target device **203** in the setup mode, and receive an input requesting registration of the identified at least one target device **203** in the setup mode in the server **204** from the user. To this end, the first electronic device **201** may display various types of interfaces for receiving a user input, as illustrated in **701** of FIG. **7A**. For example, as illustrated in **702** of FIG. **7A**, the first electronic device **201** may display information related to the identified target device **203** in the setup mode on an execution screen of a specific application (e.g., a screen of a Smart Things app) and receive **712** an input for registering the target device **203** on the execution screen of the specific application. In this case, in response to the identification of the at least one target device **203** in the setup mode, the first electronic device **201** may automatically display the above-described execution screen of the specific application. In another example, as illustrated in **703** of FIG. **7A**, the first electronic device **201** may display the execution screen of the specific application including information related to the identified target device **203** in the setup mode and receive **713** an input requesting registration of the target device **203**, in response to a command to execute the specific application from the user (e.g., selection of an icon for executing the specific application on a home screen). In another example, as illustrated in **704** of FIG. **7A**, the first electronic device **201** may display a communication setting screen (e.g., a BLE communication setting) including the information related to the identified setup mode target device **203**, and receive **714** a user input for registering the target device **203** on the communication setting screen (e.g., the BLE communication setting screen).

(100) The first electronic device **201** (e.g., the at least one processor) may display an interface (e.g., the execution screen of the specific application described above) for performing a procedure of registering the generated first information and second information, the device ID, and the various types of additional information in the server **204**, based on reception of an input requesting registration of the target device **203** in the server **204** from the user, as illustrated in **704** of FIG. **7A**. The first electronic device **201** may receive various types of information related to the target device **203** from the user on the interface. For example, as illustrated in **705** of FIG. **7A**, the first electronic device **201** may receive location information about the target device **203** from the user. Then, when the procedure is completed, the first electronic device **201** may automatically transmit, to the server **204**, a request message for registering the generated first information and second information, the device ID, and the various types of additional information to the server **204**, as illustrated in **706** of FIG. **7A**. Accordingly, as illustrated in **707** of FIG. **7A**, the first information, the second information, the device ID, and the various types of additional information may be registered.

(101) According to certain embodiments, the server **204** (e.g., at least one processor) may store the first information, the second information, the device ID, and the various types of additional information received from the first electronic device **201** in operation **507**.

(102) According to certain embodiments, the server **204** (e.g., the at least one processor) may store the first information, the second information, the device ID, and the various types of additional

information on an account basis. For example, the server **204** may store information about a plurality of accounts **605** and **606**, and receive or manage information received from the first electronic device **201** on an account basis, as illustrated in FIG. **7**A. In this case, the server **204** may generate the device ID identifying the target device **203** instead of receiving the device ID from the first electronic device **201** in operation **506** as described above. For example, the server **204** may generate specific identification information and use the generated identification information as the device ID. The operation of autonomously generating the device ID by the server **204** may be performed in the same manner as the above-described operation of autonomously generating the device ID by the first electronic device **201**, and thus a redundant description will be omitted.

(103) According to certain embodiments, each of the accounts **605** and **606** may include at least one electronic device. That is, the server may store and manage information about a list of electronic devices included in the accounts **605** and **606**. Accordingly, the server **204** may identify at least one electronic device included in a specific account, and grant a right to access information (e.g., first information and/or second information) assigned to the specific account to the at least one device (e.g., the at least one device may register information in the specific account or receive information registered in the specific account). Specifically, the server **204** may request information (e.g., an account ID or an account password) for using the specific account from electronic devices accessing the server **204**, and when the requested information is received, grant a right to access to the specific account to a corresponding electronic device.

(104) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may request the server **204** to generate a specific account. For example, as illustrated in FIG. **7**A, the first electronic device **201** may transmit **601** a message requesting generation of a first account **605** including the first electronic device **201** to the server **204**. In this case, the first electronic device **201** may set information (e.g., an account ID or an account password) for using the generated first account **605**.

(105) Further, the first electronic device **201** (e.g., the at least one processor) may request registration of information (the first information, the second information, the device ID, and the additional information) in the generated specific account. For example, the first electronic device **201** may transmit a message requesting registration of the first information, the second information, the device ID, and the additional information in the first account **605** to the server **204**, as illustrated in FIG. FIG. **7**A. Upon receipt of the request, the server **204** may allocate the first information, the second information, the device ID, and the additional information to the first account **605**.

(106) Further, the first electronic device **201** (e.g., the at least one processor) may transmit a message requesting inclusion or exclusion of another electronic device in the specific account, so that a right to access the information registered in the specific account is granted to or revoked from the other electronic device. For example, as illustrated in FIG. **7**A, the first electronic device **201** may request **603** the server **204** to include the second electronic device **202** in the first account **605**. Further, for example, the first electronic device **201** may request the server **204** to remove the second electronic device **202** from the first account **605**.

(107) According to certain embodiments, the first electronic device **201** may perform at least some of the above-described specific account generation, request for registration of information in a specific account, and registration of another device in the specific account of the first electronic device **201**. In other words, some of the above-described operations may be performed by the first electronic device **201** which has identified the target device **203** in the setup mode and registered the target device **203** to the server **204**. For example, the operation of specific account generation and the operation of registering another device in the specific account may be performed by the first electronic device **201**, and the other operation of requesting registration of information in the specific account may be performed by another electronic device (e.g., the second electronic device

202) other than the first electronic device **201**, included in the first account **605**. Without being limited to the above description, according to certain embodiments, at least some of the above-described operations may be performed in the first electronic device **201**.

(108) According to certain embodiments, the accounts may be classified into specific categories (e.g., a first category **721** and a second category **722**), as illustrated in FIG. **7**B. In this case, information allocated to accounts included in one category may be shared with each other. Accordingly, the first information and/or the second information included in the specific account may be shared with other accounts.

(109) For example, the first electronic device **201** may request generation of an account (e.g., the first account **605**), and request the server **204** to set a category (e.g., the first category **721**) for the generated account. The category for the account may be set according to a user input, when the first electronic device **201** generates the account, or automatically by devices (e.g., the first electronic device **201** or the server **204**) without a user input. For example, the first electronic device **201** may generate the first account and set a category (e.g., the first category **721**) for the first account according to a user input. In a specific example, the user of the first electronic device **201** may control the electronic device **201** to generate a category "family" together with an account for registering the first information and/or the second information related to the target device **203**, so that the other members of the family may also use the account. In another specific example, the user of the first electronic device

(110) Further, for example, the first electronic device **201** may request the server **204** to register another account (e.g., the second account **606**) in the generated category (e.g., the first category **721**). As illustrated in FIG. **7**B, the second account **606** as well as the first account **605** causing generation of the first category **721** may be registered in the first category **721**, and a third account **607** as well as the first account **605** causing generation of the second category **722** may be registered in the second category **722**. Accordingly, an electronic device corresponding to the second account **606** included in the same category may access and use the first information and/or the second information registered in the first account **605** (e.g., control the target device **203** by using the first information and/or the second information registered in the first account **605**).

(111) According to certain embodiments, information may be registered and shared in a specific category, as well as the registered first information and/or second information is shared between accounts included in the specific category as described above. For example, the first electronic device **201** may request the server **204** to register the first information and/or the second information in the first category **721**, and accordingly, accounts (e.g., the first account **605** and the second account **607**) included in the first category **721** may access the first information and/or the second information included in the first category **721**. Further, for example, the first electronic device **201** may request the server **204** to register information different from the information registered in the first category **721** in the second category **722**, and the information registered in the second category **722** may be shared with an account (e.g., the third account **607**) different from the accounts registered in the first category **721**.

(112) According to certain embodiments, the first electronic device **201** may directly authorize a specific device to access the first information and/or the second information. For example, the first electronic device **201** may transmit, to the server **204**, a message requesting granting of the access right to the first information and/or the second information registered in the specific account (e.g., the first account **605**) or in the specific category (e.g., the first category **721**) to another account corresponding to another electronic device. Further, for example, the first electronic device **201** may transmit, to the server, identification information about another electronic device and a message requesting granting of the access right to the first information and/or the second information registered in the specific account (e.g., the first account **605**) or the specific category (e.g., the first category **721**) to the other electronic device. Accordingly, when the other electronic device is connected to the server **204**, the server **204** may identify the other electronic device based

on identification information about the other electronic device and grant the access right to the first information and/or the second information registered in the specific account (e.g., the first account **605**) or the specific category (e.g., the first category **721**) to the other electronic device.

(113) According to certain embodiments, the first electronic device **201** (e.g., the at least one processor) may terminate the communication connection with the target device **203** in operation **508**. Since operation **508** of the first electronic device **201** may be performed in the same manner as operation **307** of the first electronic device **201** described above, a redundant description will be omitted.

(114) According to certain embodiments, the server **204** (e.g., the at least one processor) may transmit the first information, the second information, the device ID, and the additional information to the second electronic device **202** in operation **509**. For example, when identifying that the second electronic device **202** that accesses the server **204** and requests **604** information is included in the first account **605** (or obtains ID and password information to access the first account **605**), the server **204** may transmit the first information, the second information, the device ID, and the additional information registered in the first account **605** to the second electronic device **202**, as illustrated in FIG. **7**B.

(115) According to certain embodiments, when the second electronic device **202** (e.g., the at least one processor) is located within a specified distance from the target device **203**, the second electronic device **202** may receive a second signal including first information broadcast from the target device **203** in operation **510**, perform a scanning operation based on the first information in operation **511**, and perform encrypted communication with the target device **203** based on the scanning in operation **512**. For example, the second electronic device **202** may receive a second signal including the first information broadcast from the target device **203** operating in the operation mode, identify the target device **203** based on the scanning performed based on the first information stored in the second electronic device **202**, and perform encrypted communication with the target device **203** based on the second information. Operations **510** to **512** of the second electronic device **202** may be performed in the same manner as operations **308** to **311** of the second electronic device **202** described above, and thus a redundant description will be omitted.

(116) The operational load of sharing the first information and/or the second information generated as described above may be reduced by sharing the first information and/or the second information using the server **204** rather than in a D2D manner. Further, as the server **204** manages the first information and/or the second information on an account basis and grants an access right to an account, the security of the first information and/or the second information may be improved.

(117) An example operation of an electronic device (e.g., the first electronic device **201** or the second electronic device **202**) according to certain embodiments will be described below. A redundant description of the above-described electronic device (e.g., the first electronic device **201** or the second electronic device **202**) will be omitted.

(118) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may randomly generate first information (e.g., an adv ID) and second information (e.g., a symmetric key) based on pairing with the target device **203**. Herein, random may mean that the first information and/or the second information are generated as a variable value, not as a fixed value. A description will be given below of an example of randomly generating first information and/or second information in an electronic device.

(119) FIG. **8** is a flowchart **800** illustrating an example operation of randomly generating first information and/or second information in an electronic device according to certain embodiments. According to certain embodiments, the operations of the electronic device may be performed in an order different from the operation order of the electronic device illustrated in FIG. **8**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the electronic device illustrated in FIG. **8** may be performed. FIG. **8** will be described below with reference to FIG. **9**.

(120) FIG. **9** is a diagram illustrating an example operation of randomly generating first information and/or second information in an electronic device.

(121) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may receive a first signal transmitted from the target device **203** in operation **801**, and identify a state of the target device **203** based on the received first signal in operation **802**. For example, when the electronic device is located within a specified distance from the target device **203**, the electronic device may receive the first signal (e.g., an advertisement signal) transmitted from the target device **203**, and identify whether first information (e.g. an adv ID) is included in the first signal. When the first signal does not include the first information, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may identify that the target device **203** is operating in a setup mode, and when the first signal includes the first information, it may be determined that the target device **203** is operating in the operation mode.

(122) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) ma perform pairing with the target device **203** and generate the first information and/or second information in operation **804** based on the identification that the target device **203** is operating in the setup mode in operation **803**. For example, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may generate first information (e.g., an adv ID) of "xxx" and second information (e.g., a symmetric key) of "yyy", based on performing first pairing with the target device **203**, as illustrated with device **901** of FIG. **9**.

(123) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may terminate a communication connection with the target device **203** in operation **805**. Since operation **805** of the electronic device may be performed in the same manner as operation **307** of the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) described before, a redundant description will be omitted.

(124) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may receive a second signal transmitted from the target device **203**, and identify the state of the target device **203** based on the received second signal in operation **806**. For example, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may be re-disposed within the specified distance from the target device **203** after the communication is terminated (e.g., after leaving the specified distance), and accordingly, receive the second signal transmitted from the target device **203**. Since operation **806** of the electronic device may be performed in the same manner as operations **801** and **802** of the electronic device described before, a redundant description will be omitted.

(125) According to certain embodiments, in operation **808**, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may generate third information and fourth information based on identification that the target device **203** is operating in the setup mode in operation **807**. For example, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may identify information included in the second signal received from the target device **203** after the communication with the target device **203** is terminated. The electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may identify the device ID of the target device **203** stored in the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) based on the second signal received from the target device **203**, and identify the first information corresponding to the identified device ID. When identifying that the identified first information is not included in the second information received from the target device **203**, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may identify that the target device **203** has been reset to the setup mode. The electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may perform second pairing with the target device **203** reset to the setup mode, and generate

third information (e.g., an adv ID) of "zzz", different from the pre-generated first information and fourth information of "kkk" different from the pre-generated second information based on the performed second pairing, as illustrated with device **902** of FIG. **9**.

(126) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may update the newly generated third information and fourth information. For example, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may delete the first information and/or the second information pre-stored in association with the device ID of the target device **203**, and store newly generated first information and/or second information in association with the device ID of the target apparatus **203**. Further, for example, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may transmit the newly generated third information and fourth information to the server, so that the server may delete the first information and/or the second information, and store the newly generated third information and fourth information.

(127) When the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) has performed pairing multiple times (e.g., twice) with the same target device **203**, then, the operation of randomly generating first information and/or the second information by the electronic device (e.g., the second electronic device **203**) may also be performed even when the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) performs different pairings (i.e., multiple pairings) for each of different devices.

(128) As described above, as the first information and/or the second information is randomly generated, the security of the first information and/or the second information may be improved.

(129) Hereinafter, an example operation of an electronic device (e.g., the electronic device, such as the first electronic device **201** or the second electronic device **202**) will be described. A redundant description related to the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) will be omitted.

(130) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may display information related to the target device **203**.

(131) FIG. **10** is a flowchart **1000** illustrating an example operation of displaying information related to the target device **203** in an electronic device according to certain embodiments. According to certain embodiments, the operations of electronic device may be performed in an order different from the operation order of the electronic device illustrated in FIG. **10**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the electronic device illustrated in FIG. **10** may be performed. FIG. **10** will be described below with reference to FIG. **11**.

(132) FIG. **11** is a diagram illustrating an example operation of displaying information related to the target device **203** in an electronic device according to certain embodiments.

(133) According to certain embodiments, the electronic device may obtain information related to the target device **203** in operation **1001**, and display an interface for indicating the state of the target device **203** based on the information related to the target device **203** in operation **1002**.

(134) According to certain embodiments, the electronic device (e.g., the second electronic device **202**) may receive information related to the target device **203** registered in the server **204**, as illustrated in FIG. **11**. For example, the information related to the target device **203** may include at least one of the device ID of the target device **203** included in a specific account including the electronic device, stored in the server **204**, or additional information (e.g., time information and location information) stored in association with the device ID, or information for displaying a graphic element (e.g., information for displaying a graphic element corresponding to the target device **203**). Without being limited to the above description, the information for displaying a graphic element may be generated by the electronic device based on the information related to the target device **203** received from the server **204**.

(135) Alternatively, the electronic device (e.g., the first electronic device **201**) may obtain

information (e.g., the additional information including the device ID and the location information) as a result of performing pairing with the target device **203**.

(136) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may display an execution screen of a specific application including graphic elements (e.g., **1110**, **1111**, and **1112**), based on the obtained information related to the target device **203**, as illustrated in **1101** of FIG. **11**. For example, the electronic device may obtain an execution command for a specific application for provision to the target device **203**, execute the specific application based on the obtained execution command, and display the execution screen of the specific application, as illustrated in **1101** of FIG. **11**. The electronic device may display a first graphic element (e.g., icon) **1110** to represent the target device **203** that was identified based on the device ID of the target device **203**, on the execution screen of the specific application of the target device **203**. Further, the electronic device may display a second graphic element **1111** capable of providing information related to the target device **203** (e.g., a state value of the target device **203**, such as a control function thereof) in association with the above-described first graphic element **1110**. (e.g., displayed in a blank space within the first graphic element). In addition, the electronic device may display a third graphic element **1112** (e.g., an object indicating the location of the target device **203**) indicating information identified based on the additional information related to the device ID in association with the graphic element **1110**, or may display graphic elements representing target devices **203** having similar additional information in a group.

(137) According to certain embodiments, when the electronic device is located within a specified distance from the target device **203**, the electronic device may establish a communication connection with the target device **203** by receiving a signal including first information from the target device **203** in operation **1003**, and transceiving encrypted data through the communication connection based on second information in operation **1004**. For example, as illustrated in **1102** and **1103** of FIG. **11**, when the electronic device is located within a specified distance "d" from the target device **203**, the electronic device may receive an encrypted value of a specific service of the target device **203** from the target device **203**, and transmit a message for changing the state value of the specific service of the target device **203** to the target device **203**.

(138) According to certain embodiments, the electronic device may display transmitted and received data in the interface in operation **1005**. For example, as illustrated in **1102** and **1103** of FIG. **11**, when the electronic device receives the encrypted state value of the specific service of the target device **203** from the target device **203**, the electronic device may highlight the icon of the target device **203** to indicate the existence of the target device **203**, and update and display elements **1113** and **1114** to indicate the present state value of the target device **203** (e.g., indicating whether the target device **203**, such as a lamp or speaker, is on/off).

(139) Another example operation of the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) will be described below. A redundant description related to the above-described electronic device (e.g., the first electronic device **201** or the second electronic device **202**) will be omitted.

(140) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may establish a communication connection with the target device **203** in the operation mode based on obtained additional information.

(141) FIG. **12** is a flowchart **1200** illustrating an example operation of establishing a communication connection with a target device based on additional information in an electronic device according to certain embodiments. According to certain embodiments, the operations of the electronic device may be performed in an order different from the operation order of the electronic device illustrated in FIG. **12**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the electronic device illustrated in FIG. **12** may be performed. FIG. **12** will be described below with reference to FIG. **13**.

(142) FIG. **13** is a diagram illustrating an example operation of establishing a communication connection with the target device **203** based on additional information in an electronic device according to certain embodiments.

(143) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may obtain additional information in operation **1201**. For example, the first electronic device **201** may obtain the additional information upon pairing with the target device **203**. Further, for example, the second electronic device **202** may obtain the additional information related to the target device **203** from the server. Because the operation of obtaining additional information in the first electronic device **201** is performed in the same manner as operation **504** of the first electronic device **201**, and the operation of obtaining additional information in the second electronic device **202** is performed in the same manner as operation **509** of the second electronic device **202**, a redundant description will be omitted.

(144) According to certain embodiments, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may perform scanning based on the obtained additional information in operation **1202**.

(145) For example, as illustrated in **1301** and **1302** of FIG. **13**, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may control the frequency of a scan signal **1311** based on location information. The electronic device may identify the location of the target device **203** based on the obtained location information, and increase the frequency of the scan signal at the identified location. As illustrated in **1301** of FIG. **13**, when the location of the target device **203** does not correspond to the location of the electronic device, as determined by comparing the location of the target device **203** with the location of the electronic device based via the location information, the electronic device may set a scan frequency such that the scan signal **1311** is transmitted at an interval of a first time t**1**. In contrast, when the location of the target device **203** corresponds to the location of the electronic device as illustrated in **1302** of FIG. **13**, the electronic device may set the scan frequency so that the scan signal **1311** may be transmitted at an interval of a second time t**2**, which may be shorter than the first time t**1**. For example, as illustrated in FIG. **13**, the electronic device may identify location information related to the target device **203**, and identify that the target device **203** is disposed in a known location (e.g., a kitchen) **1312** based on the identified location information. The electronic device may identify whether the electronic device is also disposed at the identified location **1312**, and if so, increase the scan frequency.

(146) Further, for example, the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) may control the frequency of the scan signal based on time information. The electronic device may identify a time zone in which the pairing or the communication connection establishment with the target device **203** is performed, based on the time information so as to identify a time zone in which the target device **203** is frequently used. The electronic device may set the scan frequency of the scan signal to a higher frequency in the identified time zone than in other time zones.

(147) According to certain embodiments, when the electronic device (e.g., the first electronic device **201** or the second electronic device **202**) is located within a specified distance from the target device **203**, the target device **203** may receive a signal including first information from the target device **203** and establish a communication connection to the target device **203** in operation **1203**, and transmit/receive encrypted data through the communication connection based on second information in operation **1204**. Operations **1203** and **1204** of the electronic device may be performed in the same manner as operations **308** to **311** of the second electronic device **202** described above, and thus a redundant description will be omitted.

(148) As the scan frequency of the electronic device is adjusted based on additional information as descried above, a time taken to detect the target device **203** is reduced in a situation in which the detection possibility of the target device **203** is high, and power consumption for detection of the target device **203** may be reduced in a situation in which the detection possibility is low.

(149) An example operation of the target device **203** will be described below. A redundant description related to the above-described target device **203** will be omitted below.

(150) According to certain embodiments, the target device **203** may transmit a first signal for pairing with an electronic device (e.g., the first electronic device or the second electronic device) in the setup mode, whereas the target device **203** may transmit a second signal including first information (e.g., an adv ID) generated by the paired electronic device operating in the operation mode.

(151) FIG. **14** is a flowchart **1400** illustrating an example operation of the target device **203** according to certain embodiments. According to certain embodiments, the operations of the target device **203** may be performed in an order different from the operation order of the target device **203** illustrated in FIG. **14**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the electronic device illustrated in FIG. **14** may be performed. FIG. **14** will be described below with reference to FIGS. **15** and **16**.

(152) FIG. **15** is a diagram illustrating an example operation of the target device **203** according to certain embodiments. FIG. **16** is a diagram illustrating another example operation of the target device **203** according to certain embodiments.

(153) According to certain embodiments, in operation **1401**, the target device **203** may control the communication circuit (e.g., the BLE communication circuit) to periodically transmit a first signal. For example, when the target device **203** is operating in the setup mode, the target device **203** may periodically broadcast a first signal (e.g., an advertisement signal) **1511** that does not include first information (e.g., an adv ID), so that an electronic device (e.g., the first electronic device **201**) within a specified distance from the target device **203** may identify that the target device **203** is operating in the setup mode, as illustrated in **1501** of FIG. **15**.

(154) According to certain embodiments, in operation **1402**, the target device **203** may control the communication circuit (e.g., the BLE communication circuit) to perform pairing with a first external device located within the specified distance from the electronic device. For example, the target device **203** may receive a response message from the electronic device (e.g., the first electronic device **201**) located within the specified distance from the target device **203** in response to the broadcasting of the first signal. In response to the reception of the response message, the target device **203** may perform pairing **1512** with the electronic device (e.g., the first electronic device **201**) that has transmitted the response message, as illustrated in **1502** of FIG. **12**.

(155) According to certain embodiments, the target device **203** may transmit/receive data to/from the electronic device based on the pairing. For example, after the pairing, the target device **203** may establish a communication connection with the electronic device and transmit **1611** a signal including specific data to the electronic device (e.g., the first electronic device **201**). (e.g., a characteristic value of a specific service of the target device **203**), as illustrated in **1601** of FIG. **16**. The transmitted signal may or may not be encrypted with second information generated as a result of pairing or a temporary key other than the second information, before the second information is stored.

(156) According to certain embodiments, the target device **203** may control the communication circuit (e.g., the BLE communication circuit) to receive first information and second information for encrypted communication from the paired first electronic device in operation **1403**.

(157) According to certain embodiments, in operation **1404**, the target device **203** may control the communication circuit (e.g., the BLE communication circuit) to periodically transmit a second signal including the first information based on the reception of the first information and/or the second information. For example, the target device **203** may be set to the operation mode after the communication connection with the first electronic device is terminated. The target device **203** set to the operation mode may periodically transmit a second signal **1513** including the first information to notify another electronic device that the target device **203** is operating in the

operation mode, as illustrated in **1503** of FIG. **15**. Since operation **1404** of the target device **203** may be performed in the same manner as the operation of the target device **203** described in operation **308** of the second electronic device, a redundant description will be omitted.

(158) According to certain embodiments, the target device **203** may establish a communication connection with a second external device located within the specified distance based on the transmitted second signal in operation **1405**, and may control the communication circuit (e.g., the BLE communication circuit) to transmit or receive data to or from the first external device through the communication connection based on the second information in operation **1406**.

(159) According to certain embodiments, the target device **203** may prevent an unauthorized electronic device from identifying or controlling the state value of the target device **203**. The unauthorized electronic device may be defined as an electronic device that fails to obtain first information (e.g., an adv ID) and second information (a symmetric key).

(160) For example, as illustrated in **1602** of FIG. **16**, when the target device operating in the operation mode establishes a communication connection with an unauthorized device **1600**, the target device **203** may transmit encrypted data (e.g., an encrypted characteristic value of service A) **1612** to the unauthorized device. Alternatively, as illustrated in **1602** of FIG. **16**, when receiving a connection request from the unauthorized device **1600** operating in the operation mode, the target device **203** may ignore **1613** the received connection request.

(161) Another example operation of the target device **203** will be described below. A redundant description related to the above-described target device **203** will be omitted.

(162) According to certain embodiments, when a specified condition is satisfied, the target device **203** may transition from the operation mode to the setup mode.

(163) FIG. **17** is a flowchart **1700** illustrating an example reset operation of the target device **203** according to certain embodiments. According to certain embodiments, the operations of electronic device may be performed in an order different from the operation order of the target device **203** illustrated in FIG. **17**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the target device **203** illustrated in FIG. **17** may be performed. FIG. **17** will be described below with reference to FIG. **18**.

(164) FIG. **18** is a diagram illustrating an example reset operation of the target device **203** according to certain embodiments.

(165) According to certain embodiments, the target device **203** may periodically transmit a first signal in operation **1701**, and perform pairing with a first electronic device located within a specified distance from the electronic device based on the transmission of the first signal in operation **1702**. For example, the target device **203** may perform pairing **1811** with the electronic device based on the periodically transmitted first signal, as illustrated in **1801** of FIG. **18**.

(166) According to certain embodiments, the target device **203** may receive first information and second information for facilitating encrypted communication from the paired first electronic device in operation **1703**, store the first information and/or the second information in operation **1704**, and periodically transmit a second signal including the stored first information in operation **1705**. For example, as illustrated in **1802** of FIG. **18**, when storing the first information and/or the second information, the target device **203** may be set to the operation mode, and periodically transmit a second signal **1812** including the first information.

(167) According to certain embodiments, the target device **203** may determine whether a specified condition is satisfied in operation **1706**.

(168) According to certain embodiments, when the target device **203** performs a specified operation, the specified condition may be determined to be satisfied. For example, the specified condition may be satisfied when the target device **203** performs a particular operation of which it is capable in a pre-indicated manner. For example, as illustrated in **1803** of FIG. **18**, the specified operation may include detecting that the target device **203** is controlled to perform an operation

(e.g., an on/off operation) related to a service provided by the target device **203** (e.g., a lighting function) a specified number of times during a specified time period. When the specified operation (e.g., on/off) of the target device **203** is performed the specified number of times, the target device **203** may identify that the specified condition is satisfied. In other words, satisfying the specified condition may amount to fulfilling a preset condition (e.g., on/off is changed a specified number of times during a specified time period) to achieve a characteristic value of a specific service of the target device **203** (e.g., a count of activations of the light).

(169) According to certain embodiments, when the target device **203** performs a preset motion, the specified condition may be satisfied. For example, the target device **203** may identify a preset motion of the target device **203** (e.g., when the target device **203** is shaken upwards and downwards a specified number of times), using a sensor circuit provided to detect a motion made by the target device **203**, and when the preset motion is detected, identify that the specified condition is satisfied.

(170) According to certain embodiments, the target device **203** may delete the first information and/or the second information in operation **1707**.

(171) According to certain embodiments, when deleting the first information and/or the second information, the target device **203** may be reset from the operation mode to the setup mode. Accordingly, the target device **203** may periodically transmit a signal **1813** for notifying the existence of the target device **203** as illustrated in **1804** of FIG. **18**, and the signal may not include the first information.

(172) Another example operation of the system **200** according to certain embodiments will be described below. A redundant description related to the above-described system **200** will be omitted.

(173) According to certain embodiments, an electronic device may compare a use record stored in the target device **203** with a use record stored in the server **204**, associated with a specific account including the electronic device, and identify whether the target device **203** is controlled by an unauthorized user.

(174) FIG. **19** is a flowchart illustrating another example operation of the system **200** according to certain embodiments. According to certain embodiments, the operations of the system **200** may be performed in an order different from the operation order of the system **200** illustrated in FIG. **19**, not limited to the illustrated order. Further, according to certain embodiments, more operations than or at least one operation fewer than those of the system **200** illustrated in FIG. **19** may be performed. FIG. **19** will be described below with reference to FIG. **20**.

(175) FIG. **20** is a diagram illustrating another example operation of the system **200** according to certain embodiments.

(176) According to certain embodiments, the first electronic device **201** may perform encrypted communication with the target device **203** in operation **1901**. As illustrated in FIG. **20**, the first electronic device **201** may transmit a device ID of the first electronic device **201** to the target device **203** through encrypted communication. However, the disclosure is not limited thereto, and the first electronic device **201** may perform various types of data transmission/reception methods such as pairing with the target device **203** as well as encrypted communication. Accordingly, the first electronic device **201** may transmit the device ID of the first electronic device **201** to the target device **203** according to various types of data transmission/reception schemes such as pairing.

(177) According to certain embodiments, the target device **203** may store the device ID of the first electronic device **201** and a use record of the first electronic device **201** in operation **1902**. For example, the target device **203** may identify information about a time period during which the first electronic device **201** is connected to the target device **203** in response to the encrypted communication with the first electronic device **201**, and store the information about the identified time period in association with the received device ID of the first electronic device **201**, as a use record **2001** of the first electronic device **201** in the memory **213**, as illustrated in FIG. **20**. Further, for example, the target device **203** may store information indicating whether the first electronic

device **201** has connected to the target device **203** as the use record **2001** of the first electronic device **201**. Further, for example, instead of storing the use record **2001** of the first electronic device **201**, the target device **203** may simply store the device ID of the first electronic device **201** so that it may be identified whether the first electronic device **201** has used the target device **203**. However, without being limited to the above description, the first electronic device **201** may perform various types of communication such as pairing with the target device **203** as well as encrypted communication. Accordingly, use record information may include information about a time period during which various types of data transmission/reception schemes have been used, such as information about pairing of the first electronic device **201** with the target device **203** as well as information about a time period during which the first electronic device **201** has performed encrypted communication with the target device **203**.

(178) According to certain embodiments, in operation **1903**, the first electronic device **201** may transmit **2002** the device ID and use record of the first electronic device **201** as illustrated in FIG. **20**. The first electronic device **201** may identify the information about the time period during which the first electronic device **201** has been connected to the target device **203** as the use record of the first electronic device **201**, and transmit the identified use record and the device ID of the first electronic device to the server **204**. The device ID and use record of the first electronic device **201** may be transmitted, when a specified condition is satisfied. The specified condition may include communication reconnection of the first electronic device **201** to the server **204**, termination of communication with the target device **203** by the first electronic device **201**, and reception of a request for a use record from the server **204** by the first electronic device **201**. Since the use record of the first electronic device **201** has been described above in operation **1902**, a redundant description will be omitted.

(179) According to certain embodiments, in operation **1904**, the server **204** may identify an account of the first electronic device **201** as illustrated in FIG. **20**, and store **2003** the use record of the first electronic device **201** in association with the identified account. For example, the server **204** may identify a specific account (e.g., the first account) corresponding to the device ID of the first electronic device **201**, and store the use record of the first electronic device **201** in association with the identified first account. In other words, the use record of the first electronic device **201** may be managed by the server **204** so that electronic devices included in the first account may access the use record.

(180) According to certain embodiments, a second electronic device **205** may perform encrypted communication with the target device **203** in operation **1905**. Since operation **1905** of the second electronic device **205** may be performed in the same manner as operation **1901** of the first electronic device **201**, a redundant description will be omitted. However, the second electronic device **205** may be a device of a user unauthorized to control the target device **203**. That is, as illustrated in FIG. **20**, although the second electronic device **205** hijacks the first information and/or the second information registered in the first account including the first electronic device **201** by a predetermined method and store **2004** the information in a memory **215**, the second electronic device **205** may not be included in the first account. In other words, although the second electronic device **205** may perform encrypted communication with the target device **203** based on the first information and/or the second information, the second electronic device **205** may not be an electronic device registered in the first account, which is capable of controlling the target device **203**.

(181) According to certain embodiments, the target device **203** may store a device ID and a use record of the second electronic device **205** in operation **1906**. Since operation **1906** of the target device **203** may be performed in the same manner as operation **1902** of the target device **203**, a redundant description will be omitted.

(182) According to certain embodiments, as illustrated in FIG. **20**, the second electronic device **205** may transmit the device ID and the use record of the second electronic device **205** in operation

1907, The server **204** may identify an account of the second electronic device **205** in operation **1908** and store the use record of the second electronic device **205** in association with the identified account. Operation **1907** of the second electronic device **205** may be performed in the same manner as operation **1903** of the first electronic device **201**, and operation **1908** of the server **204** may be performed in the same manner as operation **1904** of the server **204**. Therefore, a redundant description will be omitted.

(183) According to certain embodiments, the first electronic device **201** may receive **2005** a first use record stored in association with the account of the first electronic device **201** from the server **204** in operation **1909**, as illustrated in FIG. **20**. For example, the first use record may include information about a time period during which the target device **203** has been used by each of the plurality of electronic devices included in the first account. In this case, the operation of receiving the first use record from the server **204** by the electronic device may be performed, when a specified condition is satisfied. For example, the satisfaction of the specified condition may include communication reconnection of the first electronic device **201** to the server **204**, elapse of a specified time, or request for a use record to the server **204** by the first electronic device **201**.

(184) According to certain embodiments, the first electronic device **201** may receive **2006** a second use record stored in the target device **203** from the target device **203** in operation **1910**, as illustrated in FIG. **20**. For example, the second use record may include information about a time period during which the target device **203** has been connected to each of the plurality of electronic devices.

(185) According to certain embodiments, the first electronic device **201** may compare the first use record with the second use record in operation **1911**, and identify the second electronic device **205** in operation **1912**. For example, the first electronic device **201** may compare electronic devices (e.g., the first electronic device **201**, the second electronic device **205**, and a third electronic device) connected to the target device **203** based on use records of the electronic devices (e.g., the first electronic device **201** and the third electronic device) included in the first account based on the first use record, and the second use record. The first electronic device **201** may identify from the second use record whether the target device **203** has been used by the second electronic device **205** not included in the first account, based on a result of the comparison.

(186) According to certain embodiments, the first electronic device **201** may identify whether the communication connection of the second electronic device **205** has been prevented in operation **1913**, and transmit a control signal to block the communication connection to the second electronic device **205** in operation **1914**. The target device **203** may identify the second electronic device **205** and then prevent the second electronic device **205** from connecting to the target device **203**, based on the control signal received from the first electronic device **201**.

(187) According to certain embodiments, the first electronic device **201** may control the display to display information about the identified second electronic device **205** in operation **1912**. The first electronic device **201** may ask the user whether the user of the second electronic device **205** is authorized to use the target device **203**, and determine whether the user of the second electronic device **205** is authorized to use the target device **203**, according to a user input. For example, although the second electronic device **205** is not registered in the first account, the user of the second electronic device **205** may be authorized (e.g., the user of the second electronic device **205** is the user of the third electronic device originally registered in the first account). Therefore, the first electronic device **201** may inquire whether the user of the second electronic device **205** is authorized to use the target device **203** to prevent an authorized user from being excluded.

(188) As described above, as the target device **203** manages information about devices using the target device **203**, and the server **204** manages information about the devices using the target device **203** on an account basis, an unauthorized use of the target device **203** that is not capable of accessing the server **204** may be identified. In other words, it may be identified whether the target device **203** is used by an unauthorized user, and the unauthorized use may be stopped.

(189) According to certain embodiments, an electronic device (e.g., **201**) may include a communication circuit, a memory configured to store instructions, and at least one processor configured to execute the instructions stored in the memory. The instructions may be configured to cause the at least one processor to receive a first signal output from a first external device (e.g., **203**) through the communication circuit, identify a mode of the first external device (e.g., **203**) based on the received first signal, control the communication circuit to establish a connection with the first external device, based on identifying that a state of the first external device (e.g., **203**) is a first mode, in response to the connection, generate first information to be included in a second signal to be periodically transmitted from the first external device which is in a second mode, and second information for encrypted communication with the first external device, and control the communication circuit to transmit the first information and the second information to the first external device and a second external device (e.g., **204**) different from the first external device (e.g., **203**).

(190) According to certain embodiments, in the electronic device (e.g., **201**), the instructions may be configured to cause the at least one processor to control the communication circuit to perform pairing with the first external device based on BLE communication, based on identifying that the state of the first external device is the first mode, and transmit the first information and the second information to the first external device and the second external device different from the first external device through encrypted communication based on the pairing.

(191) According to certain embodiments, in the electronic device (e.g., **201**), the instructions may be configured to cause the at least one processor to control the communication circuit to receive a second signal including the first information, output from the first external device (e.g., **203**), after the pairing is released, connect to the first external device in response to the received second signal, and control the communication circuit to transmit a signal for controlling the connected first external device, based on the second information.

(192) According to certain embodiments, in the electronic device (e.g., **201**), the signal for controlling the first external device (e.g., **203**) may be encrypted with the second information.

(193) According to certain embodiments, in the electronic device (e.g., **201**), the instructions may be configured to cause the at least one processor to control the communication circuit to transmit, to the second external device (e.g., **204**), a message requesting registration of the first information and the second information.

(194) According to certain embodiments, the electronic device (e.g., **201**) may be included in a first account, and the first information and the second information may be registered in the first account based on the message such that the first information and the second information is capable of being provided to at least one device (e.g., **202**) other than the electronic device (e.g., **201**), included in the first account.

(195) According to certain embodiments, in the electronic device (e.g., **201**), the instructions may be configured to cause the at least one processor to control the communication circuit to transmit, to the second external device (e.g., **204**), a first message requesting registration of the at least one device (e.g., **202**) other than the electronic device (e.g., **201**) in the first account.

(196) According to certain embodiments, in the electronic device (e.g., **201**), the instructions may be configured to cause the at least one processor to receive a third signal output from the first external device (e.g., **203**), and generate third information to be included in a fourth signal to be periodically transmitted from the first external device (e.g., **203**) and fourth information for encrypted communication with the first external device (e.g., **203**) based on the received third signal, based on identifying that the state of the first external device (e.g., **203**) is the first mode.

(197) According to certain embodiments, in the electronic device (e.g., **201**) may further include a display, and the instructions may be configured to cause the at least one processor to obtain a command for executing an application for providing the state of the first external device (e.g., **203**), execute, based on the command, the application, and control the display to display an execution

screen of the application, including at least one graphic element representing the state of the first external device (e.g., **203**).

(198) According to certain embodiments, in the electronic device (e.g., **201**), the instructions may be configured to cause the at least one processor to control the communication circuit to receive a value indicating the state of the first external device from the first external device (e.g., **203**), encode the value based on the second information, and update, based on the encoded value, the at least one graphic element representing the state of the first external device (e.g., **203**) and control the display to display the updated at least one graphic element.

(199) According to certain embodiments, an electronic device (e.g., **202**) may include a communication circuit, a memory configured to store instructions, and at least one processor configured to execute the instructions stored in the memory. The instructions may be configured to cause the at least one processor to control the communication circuit to receive first information to be included in a signal to be periodically transmitted from a first external device (e.g., **203**) and second information for encrypted communication with the first external device (e.g., **203**), such that the first information and the second information may be generated in a second external device (e.g., **201**) based on pairing between the first external device (e.g., **203**) and the second external device (e.g., **201**), receive a signal broadcast from the first external device (e.g., **203**) through the communication circuit, control the communication circuit to connect to the first external device (e.g., **203**) based on identifying the obtained signal including the first information, and control the communication circuit to transmit data to or receive data from the connected first external device (e.g., **203**) based on the second information.

(200) According to certain embodiments, in the electronic device (e.g., **202**), the instructions may be configured to cause the at least one processor to control the communication circuit to transmit a message requesting the first information and the second information from a server, and control the communication circuit to receive the first information and the second information stored in the server (e.g., **204**) from the server (e.g., **204**).

(201) According to certain embodiments, in the electronic device (e.g., **202**), the first information and the second information may be allocated to a first account in the server (e.g., **204**). The instructions may be configured to cause the at least one processor to control the communication circuit to receive the first information and the second information from the server (e.g., **204**).

(202) According to certain embodiments, in the electronic device (e.g., **202**), the instructions may be configured to cause the at least one processor to perform scanning based on the first information, and when receiving the signal including the first information based on the scanning, identify that the first information is included in the obtained signal.

(203) According to certain embodiments, an electronic device (e.g., **203**) may include a memory configured to store instructions and at least one processor configured to execute the instructions stored in the memory. The instructions may be configured to cause the at least one processor to control the communication circuit to periodically transmit a first signal, control the communication circuit to connect the electronic device (e.g., **203**) to a first external device (e.g., **201**) based on the transmitted first signal, control the communication circuit to receive first information, and second information for encrypted communication from the paired first external device (e.g., **201**), control the communication circuit to periodically transmit a second signal including the first information, based on receiving the first information and the second information, control the communication circuit to connect to a second external device (e.g., **202**) based on the transmitted second signal, and control the communication circuit to transmit or receive data to or from the connected first external device (e.g., **201**) based on the second information.

(204) According to certain embodiments, in the electronic device (e.g., **203**), the communication circuit may be provided to support short-range wireless communication and not to be capable of performing communication with at least one external device through a relay.

(205) According to certain embodiments, in the electronic device (e.g., **203**), the instructions may

be configured to cause the at least one processor to control the communication circuit to transmit a third signal including a state value of the electronic device before receiving the first information and the second information, such that the state value included in the third signal is not encrypted, and control the communication circuit to transmit a fourth signal including a state value of the electronic device (e.g., **203**) after receiving the first information and the second information, such that the state value included in the fourth signal may be encrypted based on the second information.

(206) According to certain embodiments, in the electronic device (e.g., **203**), the instructions may be configured to cause the at least one processor to store the first information and the second information, after receiving the first information and the second information, when a predetermined condition is satisfied, delete the stored first information and second information, and control the communication circuit to periodically transmit the first signal again.

(207) According to certain embodiments, in the electronic device (e.g., **203**), the instructions may be configured to cause the at least one processor to perform pairing again with the first external device (e.g., **201**) located within a specified distance from the electronic device (e.g., **203**), based on the first signal which is periodically transmitted again, and control the communication circuit to receive third information different from the first information and fourth information different from the second information from the first external device (e.g., **201**).

(208) According to certain embodiments, in the electronic device (e.g., **203**), the instructions may be configured to cause the at least one processor to control the communication circuit to receive a message requesting communication from a second external device (e.g., **202**), after receiving the first information and the second information, and when the second external device (e.g., **202**) has not stored the first information, ignore the message received from the second external device (e.g., **202**).

Claims

1. An electronic device, comprising: first communication circuitry; second communication circuitry; memory storing instructions; and at least one processor communicatively coupled to the first communication circuitry, the second communication circuitry and the memory, wherein the instructions are executable by the at least one processor to cause the electronic device to: receive a first signal from a first external device, via the first communication circuitry, identify a present mode of the first external device, based on the received first signal, control the first communication circuitry to establish a communicative connection with the first external device, based on identifying that the first external device is operating in a first mode, in response to establishing the connection, generate first information for inclusion in a second signal to be periodically transmitted from the first external device operating in a second mode, and second information for encrypting communications with the first external device, control the first communication circuitry to transmit the first information and the second information to the first external device, and transmit, via the first communication circuitry or the second communication circuitry, the first information and the second information to a second external device different from the first external device.

2. The electronic device of claim 1, wherein the instructions are further executable to cause the electronic device to: control the first communication circuitry to perform pairing with the first external device based on Bluetooth Low-Energy (BLE) communication, based on identifying that first external device is operating in the first mode, and wherein the first information and the second information transmitted to the first external device are encrypted, based on the pairing.

3. The electronic device of claim 1, wherein the instructions are further executable to cause the electronic device to: after the connection is released, receive via the first communication circuitry a second signal including the first information, from the first external device establish connection to the first external device in response to receiving the second signal, and transmit, via the first communication circuitry, a signal for controlling the connected first external device, based on the

second information.

4. The electronic device of claim 3, wherein the signal for controlling the first external device is encrypted with the second information.

5. The electronic device of claim 1, wherein the instructions are further executable to cause the electronic device to: transmit, to the second external device, a first message requesting registration of the first information and the second information.

6. The electronic device of claim 5, wherein the electronic device is related to a first user account, and wherein the first information and the second information are registered to the first user account based on the transmitted first message, such that the first information and the second information is providable to at least one device registered to the first user account other than the electronic device.

7. The electronic device of claim 6, wherein the instructions are further executable to cause the electronic device to: transmit, to the second external device, a second message requesting registration of the at least one device other than the electronic device to the first user account.

8. The electronic device of claim 1, wherein the instructions are further executable to cause the electronic device to: receive a third signal that is output from the first external device, and generate third information for inclusion in a fourth signal to be periodically transmitted from the first external device, and fourth information for encrypting communications with the first external device based on the received third signal, after identifying that the first external device is operating in the first mode.

9. The electronic device of claim 1, further comprising a display, wherein the instructions are further executable to cause the electronic device to: based on receiving a command, executing an application providing a present mode of the first external device, and within the executed application, control the display to display an execution screen, including at least one graphic element representing the present mode of the first external device.

10. The electronic device of claim 9, wherein the instructions are further executable to cause the electronic device to: receive a value indicating the present mode of the first external device from the first external device via the first communication circuitry, encode the value based on the second information, and based on the encoded value, update the at least one graphic element representing the present mode of the first external device, and control the display to display the updated at least one graphic element.

11. A method in an electronic device, comprising: receiving a first signal from a first external device, via first communication circuitry; identifying, via at least one processor, a present mode of the first external device, based on the received first signal; establishing, via the first communication circuitry, a communicative connection with the first external device, based on identifying that the first external device is operating in a first mode; in response to establishing the connection, generating, via the at least one processor, first information for inclusion in a second signal to be periodically transmitted from the first external device operating in a second mode, and second information for encrypting communications with the first external device; and transmitting the first information and the second information to the first external device and to a second external device different from the first external device.

12. The method of claim 11, further comprising: pairing with the first external device based on Bluetooth Low-Energy (BLE) communication, based on identifying that first external device is operating in the first mode, wherein the first information and the second information transmitted to the first external device are encrypted, based on the pairing.

13. The method of claim 11, further comprising: after the connection is released, receiving via the first communication circuitry a second signal including the first information, from the first external device establishing connection to the first external device in response to receiving the second signal, and transmitting, via the first communication circuitry, a signal for controlling the connected first external device, based on the second information.

14. The method of claim 13, wherein the signal for controlling the first external device is encrypted

with the second information.

15. The method of claim 11, further comprising: transmitting, to the second external device via the first communication circuitry or second communication circuitry, a first message requesting registration of the first information and the second information.

16. An electronic device, comprising: first communication circuitry for communicating with a first external device within a certain range; second communication circuitry for communicating with a server; memory storing instructions; and at least one processor communicatively coupled to the first communication circuitry, the second communication circuitry and the memory, wherein the instructions are executable by the at least one processor to cause the electronic device to: receive a first signal from a first external device, via the first communication circuitry, identify a present mode of the first external device, based on the received first signal, in case that the first external device operates in a first mode: transmit, via the first communication circuitry, first information related to a second signal to the first external device, and transmit, via the second communication circuitry, the first information and second information to the server, wherein the first information causes the first external device to operate in a second mode and to periodically transmit the second signal based on the first information in the second mode, and wherein the second information allows another external device, upon receiving the second signal, to remotely control the first external device.

17. The electronic device of claim 16, wherein the instructions are further executable to cause the electronic device to: control the first communication circuitry to perform pairing with the first external device based on Bluetooth Low-Energy (BLE) communication, based on identifying that first external device is operating in the first mode, and wherein the first information and the second information transmitted to the first external device are encrypted, based on the pairing.

18. The electronic device of claim 16, wherein the instructions are further executable to cause the electronic device to: after the connection is released, receive via the first communication circuitry a second signal including the first information, from the first external device establish connection to the first external device in response to receiving the second signal, and transmit, via the first communication circuitry, a signal for controlling the connected first external device, based on the second information.

19. The electronic device of claim 16, wherein the instructions are further executable to cause the electronic device to: transmit, to the server, a first message requesting registration of the first information and the second information, wherein the electronic device is related to a first user account, and wherein the first information and the second information are registered to the first user account based on the transmitted first message, such that the first information and the second information are providable to at least one device registered to the first user account other than the electronic device.

20. The electronic device of claim 16, wherein the instructions are further executable to cause the electronic device to: receive a value indicating the present mode of the first external device from the first external device via the first communication circuitry, encode the value based on the second information, and based on the encoded value, update at least one graphic element representing the present mode of the first external device, and display the updated at least one graphic element.