US009721441B2

(12) **United States Patent**
Lee et al.

(10) **Patent No.: US 9,721,441 B2**
(45) **Date of Patent: *Aug. 1, 2017**

(54) **SYSTEM AND METHOD FOR TRANSMITTING MESSAGES RELATED TO OPERATIONS OF ELECTRONIC DEVICES**

(71) Applicant: **Samsung Electronics Co., Ltd.**, Gyeonggi-do (KR)

(72) Inventors: **Kangmin Lee**, Gyeonggi-do (KR); **Hyungrae Cho**, Seoul (KR); **Jihyeon Kweon**, Gyeonggi-do (KR); **Seokmin Oh**, Gyeonggi-do (KR)

(73) Assignee: **Samsung Electronics Co., Ltd** (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/666,978**

(22) Filed: **Mar. 24, 2015**

(65) **Prior Publication Data**

US 2015/0194027 A1 Jul. 9, 2015

Related U.S. Application Data

(63) Continuation of application No. 13/661,775, filed on Oct. 26, 2012, now Pat. No. 8,988,243.

(30) **Foreign Application Priority Data**

Oct. 26, 2011 (KR) 10-2011-0109801

(51) **Int. Cl.**
G08B 21/00 (2006.01)
G08B 5/22 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G08B 5/222*** (2013.01); ***H04L 12/1859*** (2013.01); ***H04L 12/1895*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G08B 5/222; H04L 12/2803; H04W 4/12
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,586,174 A * 12/1996 Bogner H02J 13/0024 340/533
6,157,313 A * 12/2000 Emmermann G08B 5/223 340/12.54

(Continued)

FOREIGN PATENT DOCUMENTS

CN 101051976 10/2007
CN 102131016 7/2011

(Continued)

OTHER PUBLICATIONS

Stan Moyer et al., "Service Portability of Networked Appliances", Service Portability and Virtual Home Environment, IEEE Communications Magazine, Jan. 1, 2002.

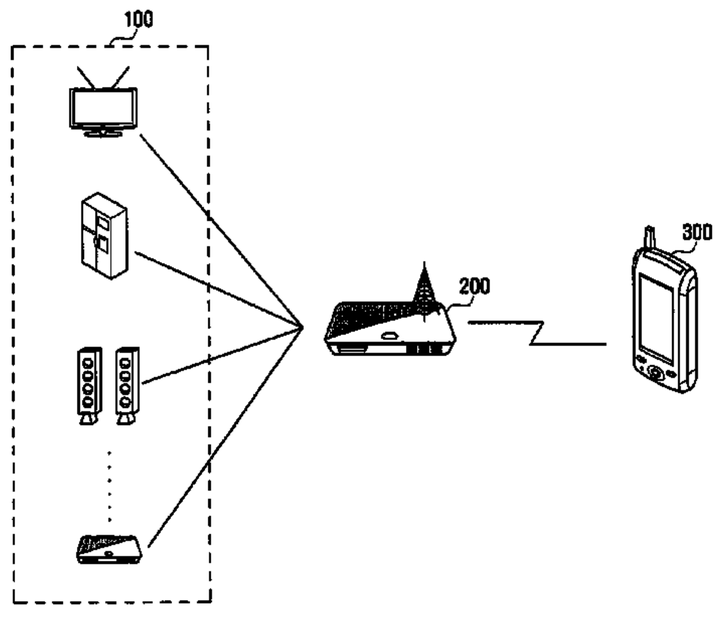
(Continued)

Primary Examiner — Phung Nguyen
(74) *Attorney, Agent, or Firm* — The Farrell Law Firm, P.C.

(57) **ABSTRACT**

A system and method are provided for transmitting messages related to operations of electronic devices. A management apparatus is notified of an event that occurred in a specific one of a plurality of electronic devices. The management apparatus determines one or more target devices in response to notification of the event that occurred in the specific electronic device. An event message corresponding to the event that occurred in the specific electronic device is created. The management apparatus transmits the event message to the one or more target devices. The one or more target devices output the received event message.

16 Claims, 8 Drawing Sheets



(51) **Int. Cl.**

H04L 12/28	(2006.01)
H04W 4/02	(2009.01)
H04W 4/20	(2009.01)
H04L 12/18	(2006.01)
H04L 12/58	(2006.01)

(52) **U.S. Cl.**
CPC ***H04L 12/2823*** (2013.01); ***H04L 51/14*** (2013.01); ***H04W 4/021*** (2013.01); ***H04W 4/20*** (2013.01)

(58) **Field of Classification Search**
USPC 340/540, 691.3, 309.16, 679, 539.26, 340/539.18; 455/11.1
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,703,930	B2 *	3/2004	Skinner	G08B 25/006 340/531
6,873,255	B2 *	3/2005	Gallagher	D06F 33/02 340/309.16
8,185,644	B2 *	5/2012	Simon	H04M 11/04 340/531
8,594,969	B2 *	11/2013	Lill	G05B 19/0428 340/539.11
9,495,859	B2 *	11/2016	Ha	H04L 27/28
2002/0095269	A1	7/2002	Natalini et al.	
2005/0160105	A1 *	7/2005	Lee	G06F 3/038
2006/0271695	A1	11/2006	Lavian	
2007/0261064	A1 *	11/2007	Jin	H04L 12/2803 719/318
2009/0100132	A1 *	4/2009	Ebrom	D06F 39/005 709/203
2009/0193438	A1 *	7/2009	Jin	H04L 12/2838 719/318
2010/0040213	A1	2/2010	Park et al.	
2011/0074570	A1	3/2011	Feldstein et al.	
2011/0106279	A1	5/2011	Cho et al.	
2013/0082526	A1	4/2013	Lee et al.	
2014/0009300	A1	1/2014	Ha et al.	

FOREIGN PATENT DOCUMENTS

CN	103891203	6/2014
KR	100747427	8/2007
KR	100791297	1/2008
KR	1020090082073	7/2009
KR	1020100043582	4/2010
KR	100970729	7/2010
KR	1020110010375	2/2011
WO	WO 2011/053008	5/2011

OTHER PUBLICATIONS

European Search Report dated Mar. 26, 2015 issued in counterpart application No. 12843167.3-1862.
Chinese Office Action dated Jun. 29, 2016 issued in counterpart application No. 201280052832.7, 14 pages.

* cited by examiner

FIG. 1

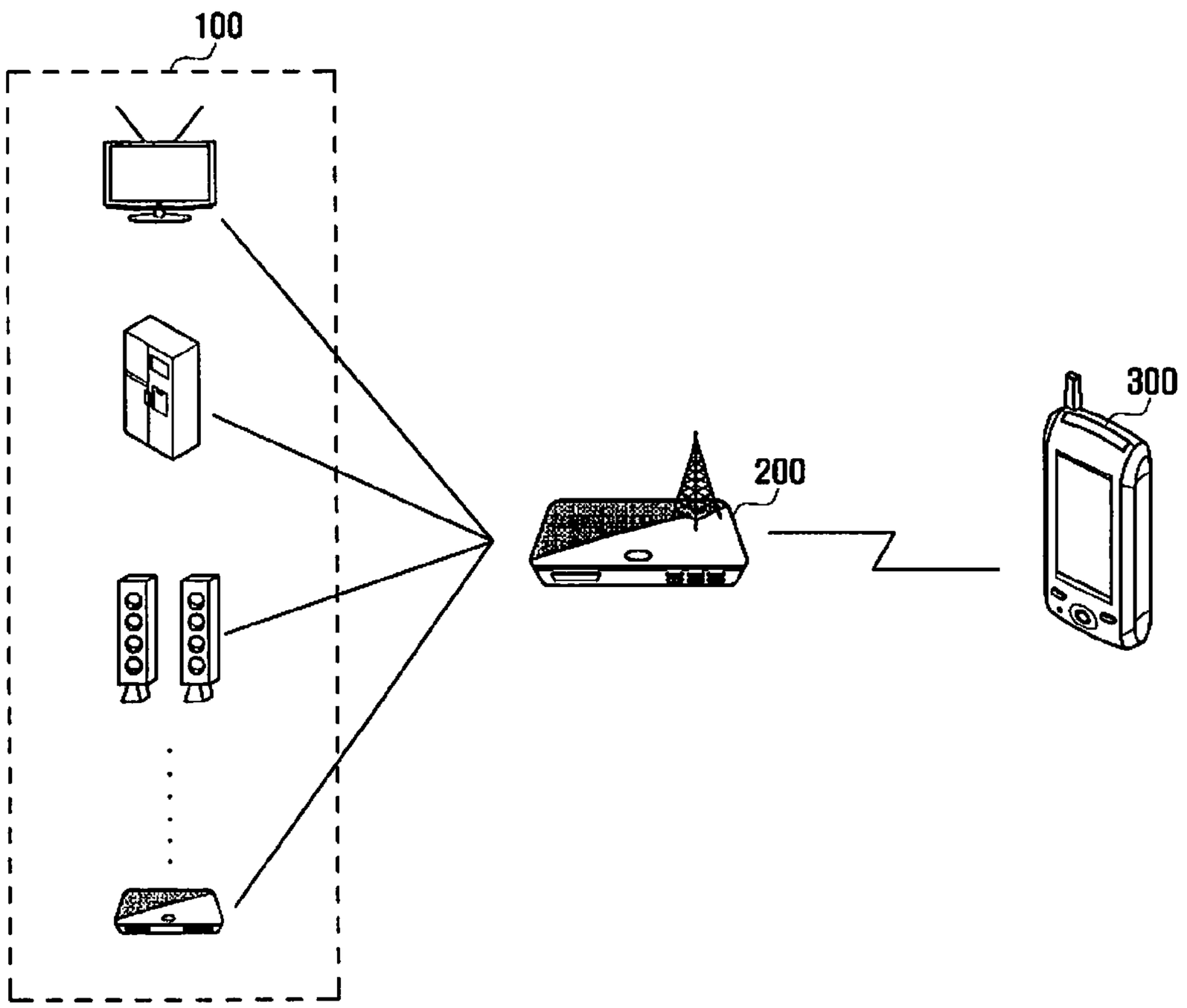


FIG. 2

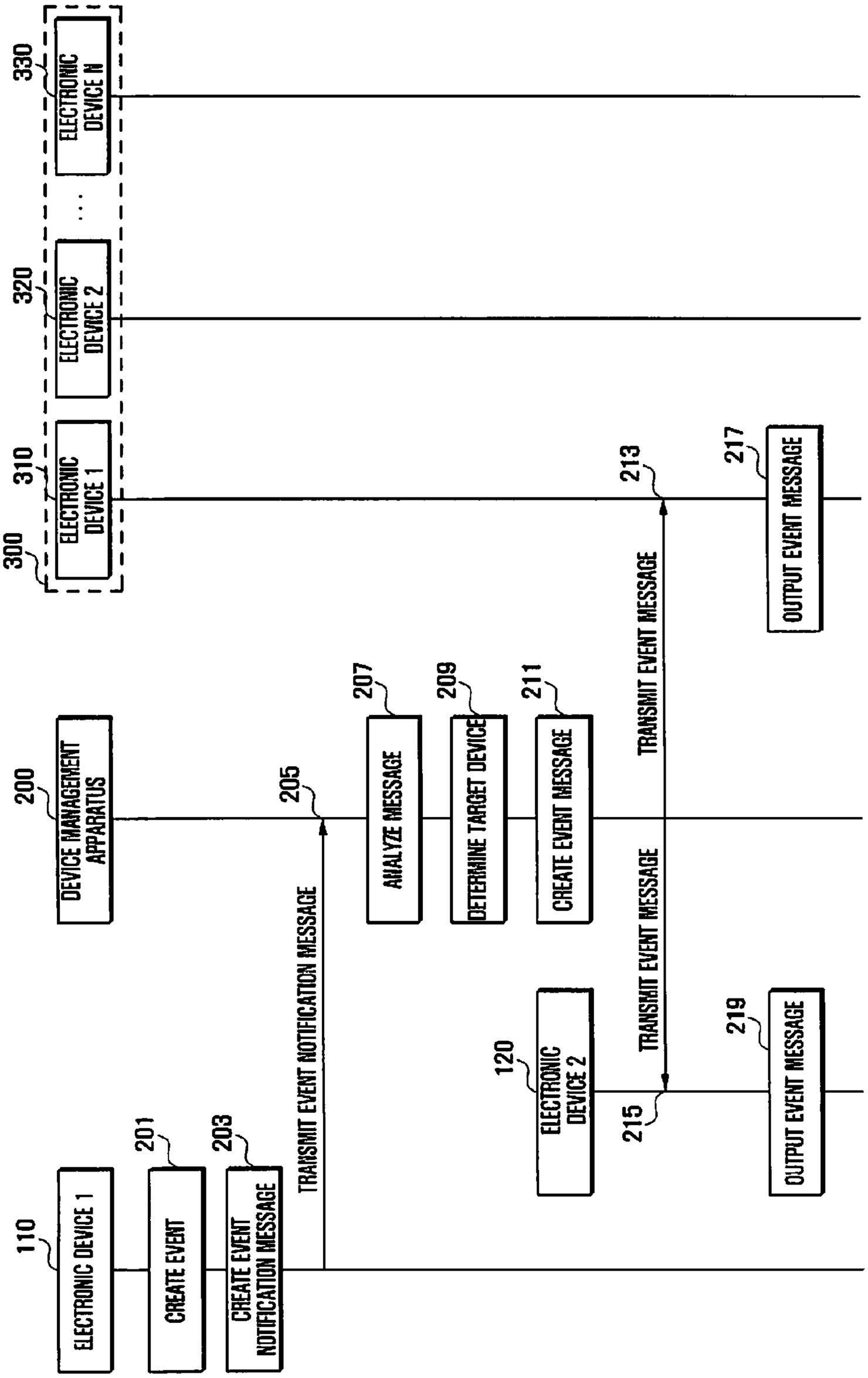

ELECTRONIC DEVICE 1
CREATE EVENT
CREATE EVENT NOTIFICATION MESSAGE
TRANSMIT EVENT NOTIFICATION MESSAGE
DEVICE MANAGEMENT APPARATUS
ANALYZE MESSAGE
DETERMINE TARGET DEVICE
CREATE EVENT MESSAGE
TRANSMIT EVENT MESSAGE
OUTPUT EVENT MESSAGE
ELECTRONIC DEVICE 2
TRANSMIT EVENT MESSAGE
OUTPUT EVENT MESSAGE
ELECTRONIC DEVICE 1
ELECTRONIC DEVICE 2
ELECTRONIC DEVICE N
110
201
203
200
205
207
209
211
213
217
120
215
219
300
310
320
330

FIG. 3

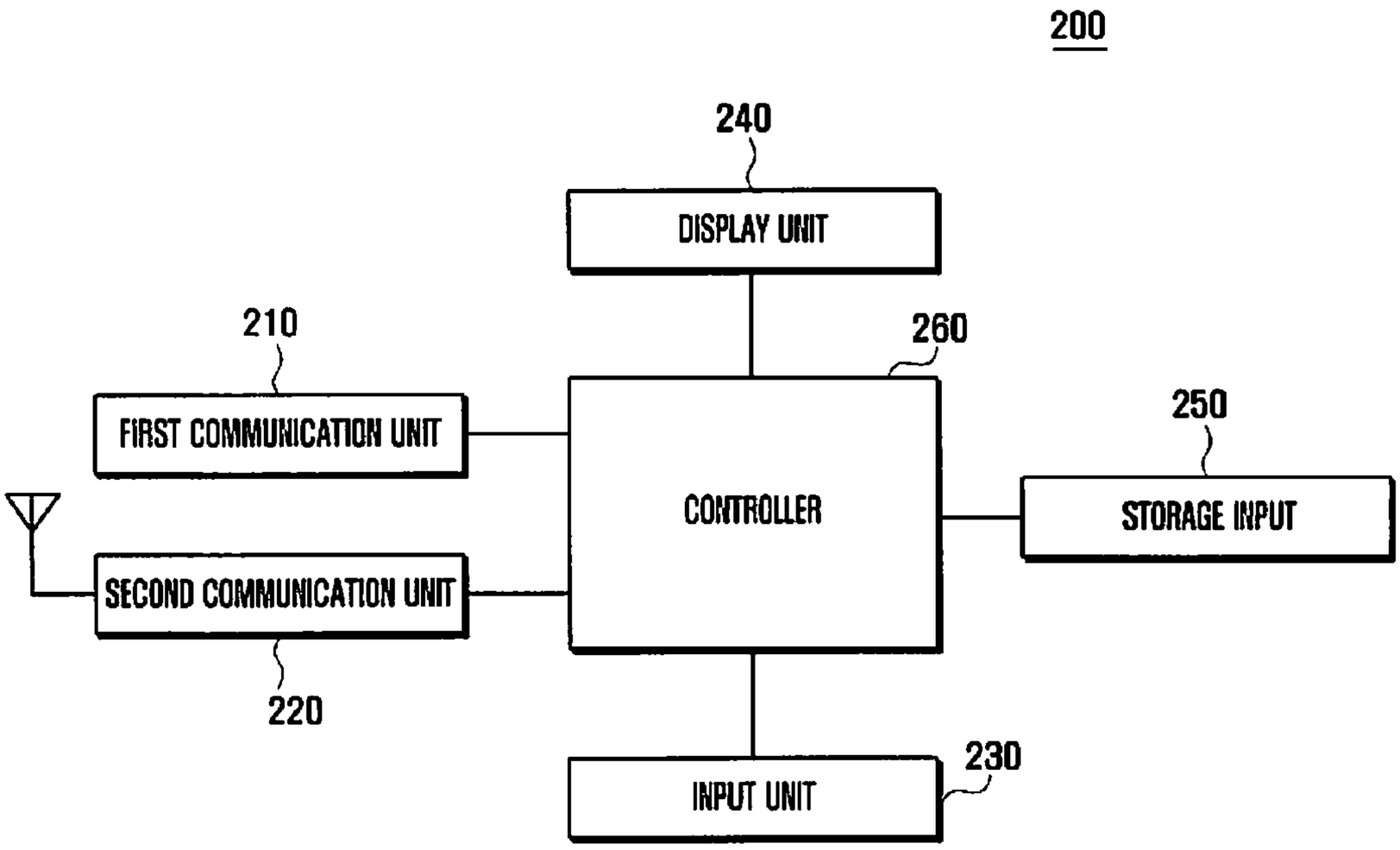

200
240
DISPLAY UNIT
210
260
FIRST COMMUNICATION UNIT
250
CONTROLLER
STORAGE INPUT
SECOND COMMUNICATION UNIT
220
230
INPUT UNIT

FIG. 4

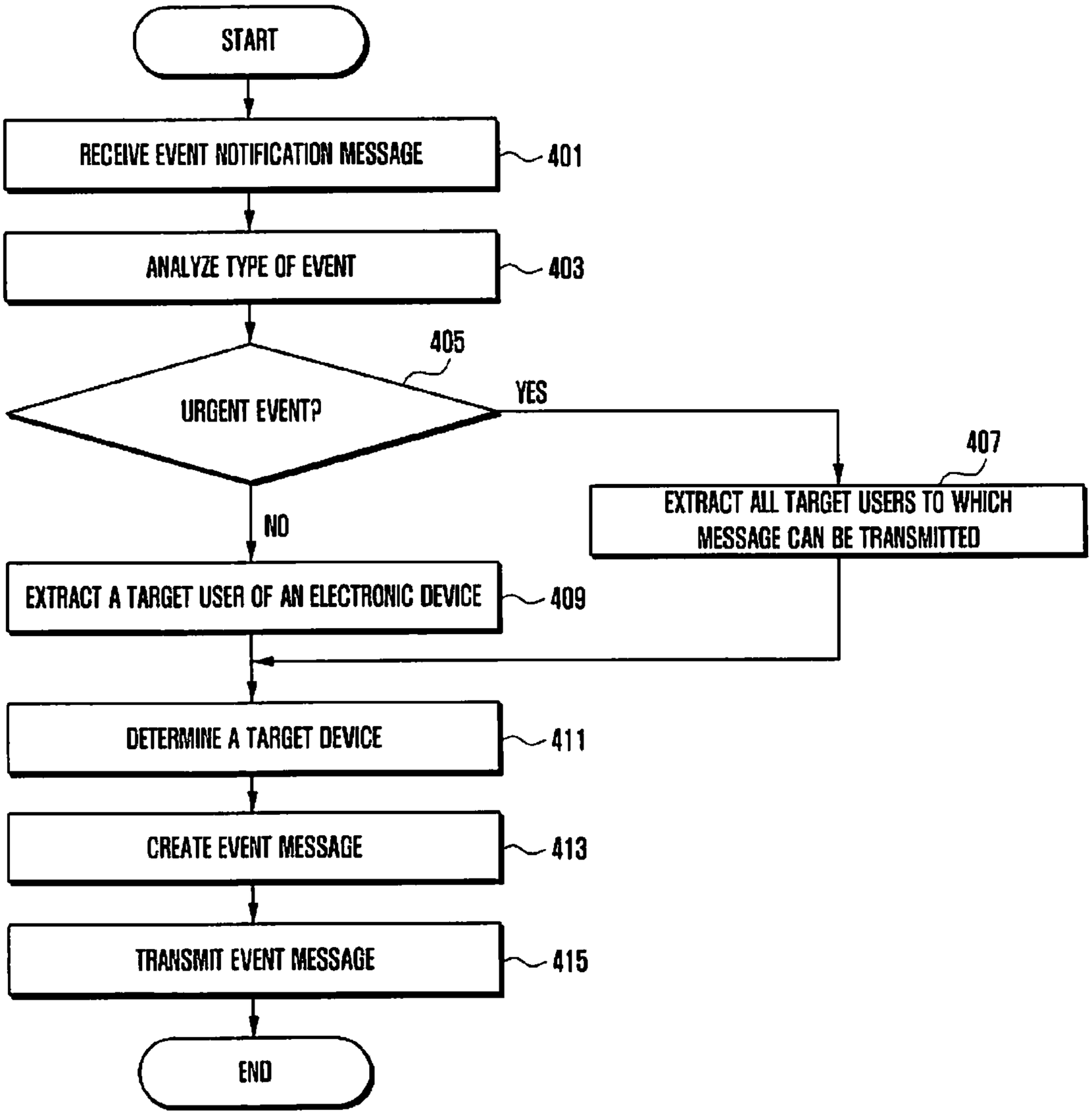

START
RECEIVE EVENT NOTIFICATION MESSAGE
401
ANALYZE TYPE OF EVENT
403
405
URGENT EVENT?
YES
NO
407
EXTRACT ALL TARGET USERS TO WHICH MESSAGE CAN BE TRANSMITTED
EXTRACT A TARGET USER OF AN ELECTRONIC DEVICE
409
DETERMINE A TARGET DEVICE
411
CREATE EVENT MESSAGE
413
TRANSMIT EVENT MESSAGE
415
END

FIG. 5

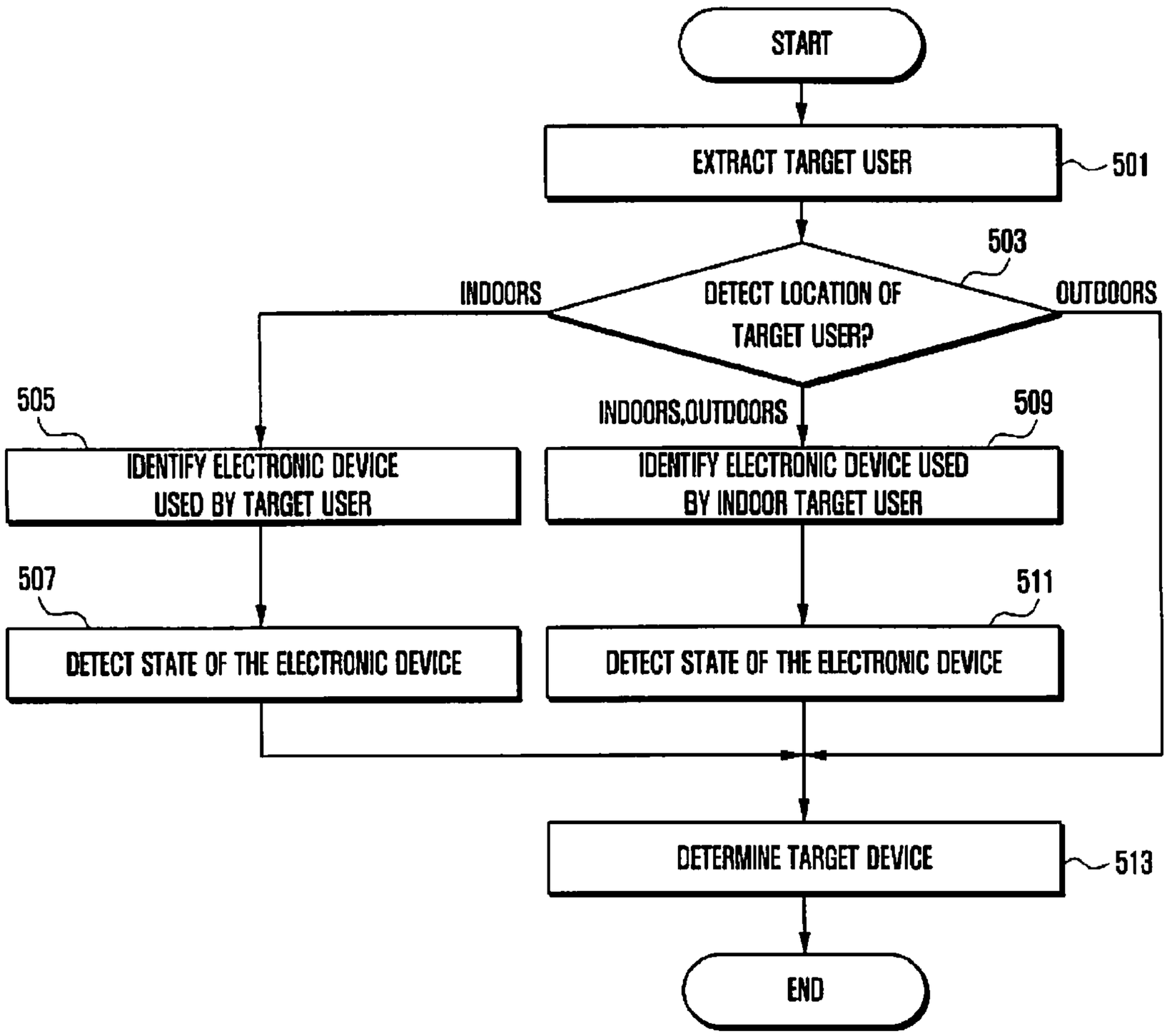

START
EXTRACT TARGET USER
501
503
DETECT LOCATION OF TARGET USER?
INDOORS
OUTDOORS
INDOORS,OUTDOORS
505
IDENTIFY ELECTRONIC DEVICE USED BY TARGET USER
509
IDENTIFY ELECTRONIC DEVICE USED BY INDOOR TARGET USER
507
DETECT STATE OF THE ELECTRONIC DEVICE
511
DETECT STATE OF THE ELECTRONIC DEVICE
DETERMINE TARGET DEVICE
513
END

FIG. 6

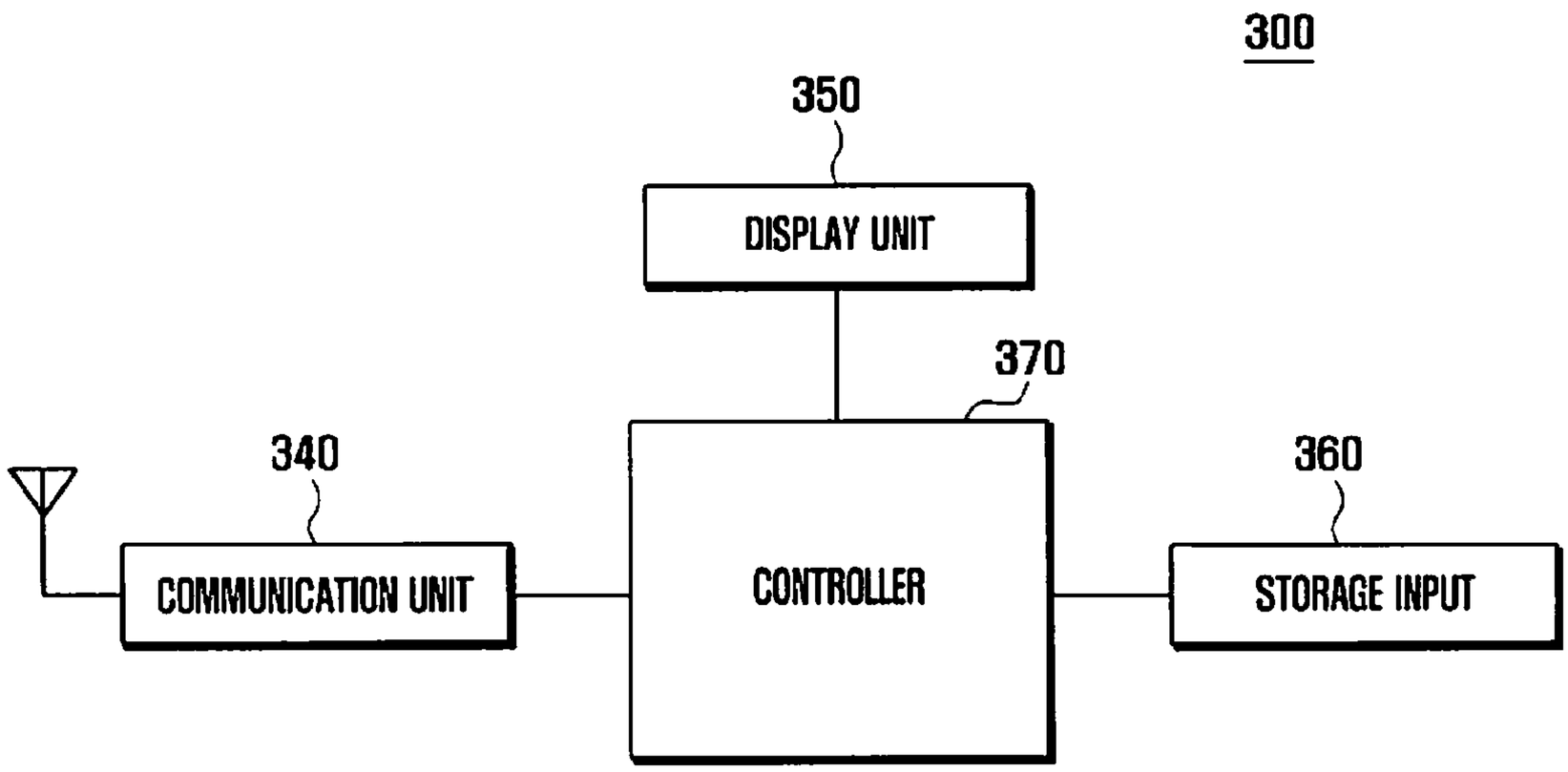

300
350
DISPLAY UNIT
370
340
360
COMMUNICATION UNIT
CONTROLLER
STORAGE INPUT

FIG. 7

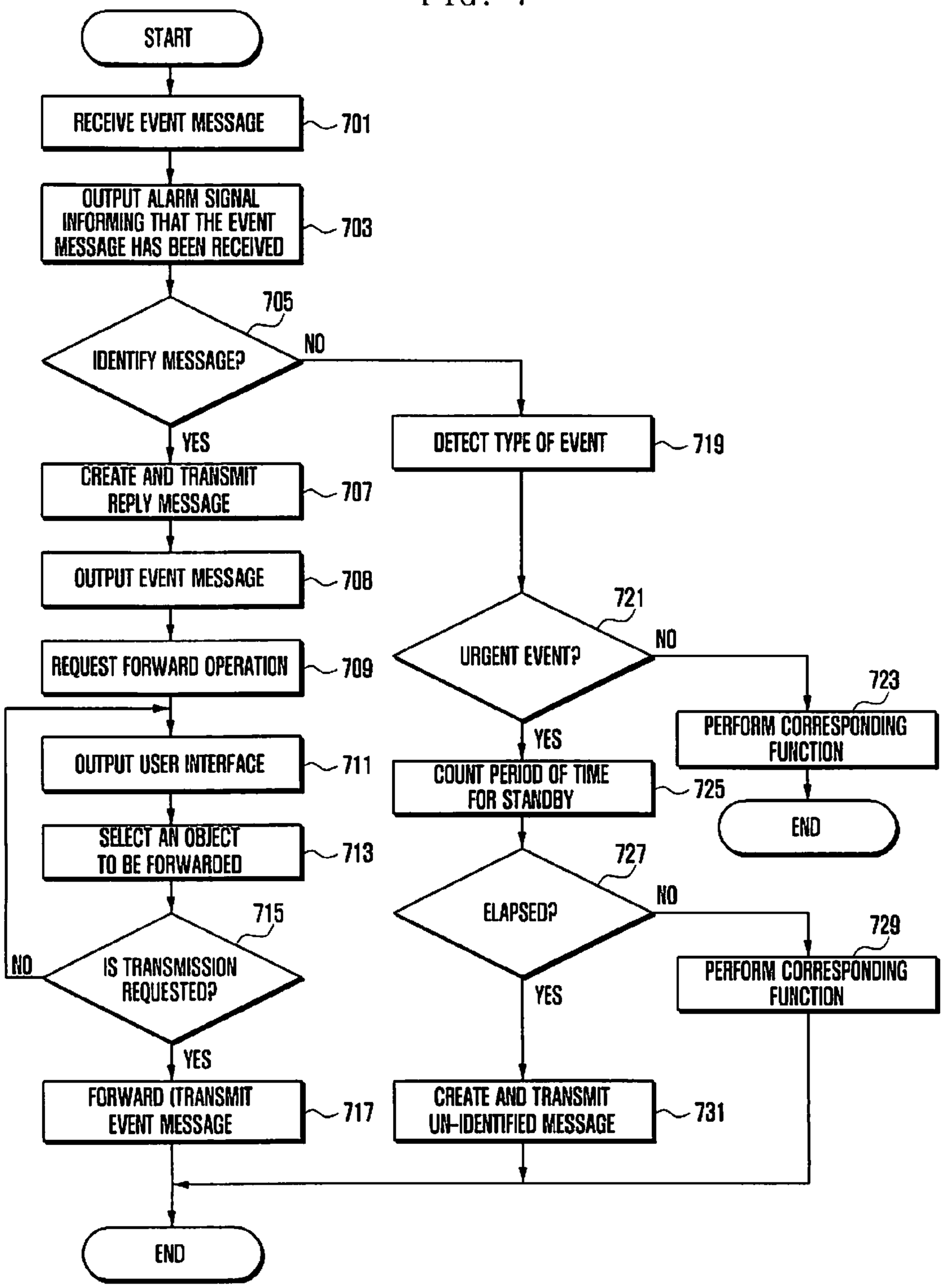
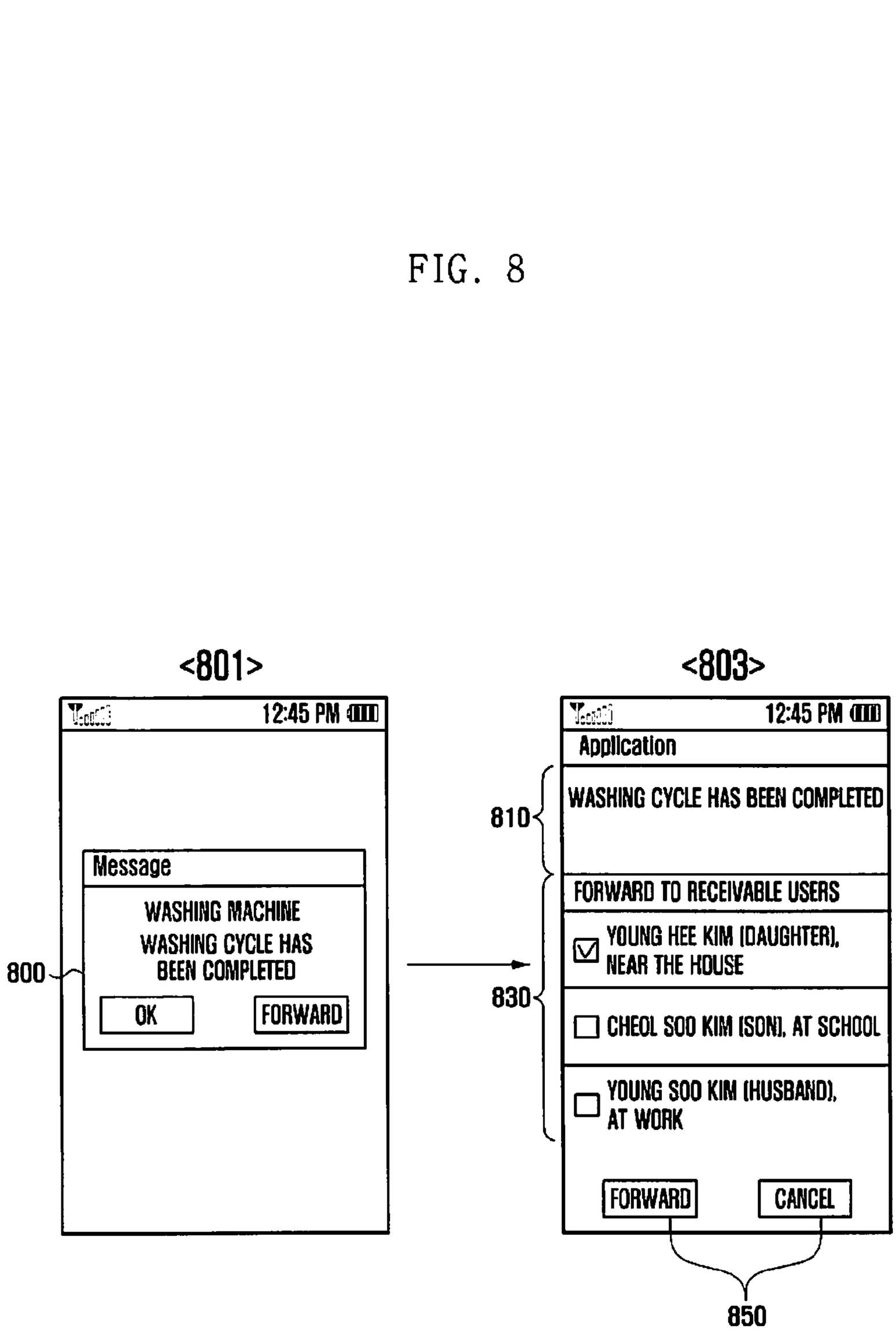

START
RECEIVE EVENT MESSAGE
701
OUTPUT ALARM SIGNAL INFORMING THAT THE EVENT MESSAGE HAS BEEN RECEIVED
703
705
IDENTIFY MESSAGE?
NO
YES
CREATE AND TRANSMIT REPLY MESSAGE
707
OUTPUT EVENT MESSAGE
708
REQUEST FORWARD OPERATION
709
OUTPUT USER INTERFACE
711
SELECT AN OBJECT TO BE FORWARDED
713
715
IS TRANSMISSION REQUESTED?
NO
YES
FORWARD (TRANSMIT EVENT MESSAGE
717
END
DETECT TYPE OF EVENT
719
721
URGENT EVENT?
NO
YES
COUNT PERIOD OF TIME FOR STANDBY
725
727
ELAPSED?
NO
YES
723
PERFORM CORRESPONDING FUNCTION
END
729
PERFORM CORRESPONDING FUNCTION
CREATE AND TRANSMIT UN-IDENTIFIED MESSAGE
731

FIG. 8


<801>
12:45 PM
Message
WASHING MACHINE
WASHING CYCLE HAS BEEN COMPLETED
OK
FORWARD
800
<803>
12:45 PM
Application
WASHING CYCLE HAS BEEN COMPLETED
810
FORWARD TO RECEIVABLE USERS
YOUNG HEE KIM (DAUGHTER), NEAR THE HOUSE
CHEOL SOO KIM (SON), AT SCHOOL
YOUNG SOO KIM (HUSBAND), AT WORK
830
FORWARD
CANCEL
850

SYSTEM AND METHOD FOR TRANSMITTING MESSAGES RELATED TO OPERATIONS OF ELECTRONIC DEVICES

PRIORITY

This application is a continuation application of U.S. patent application Ser. No. 13/661,775, which was filed on Oct. 26, 2012, now U.S. Pat. No. 8,988,243, which claims priority under 35 U.S.C. §119(a) to a Korean patent application filed on Oct. 26, 2011 in the Korean Intellectual Property Office and assigned Serial No. 10-2011-0109801, the entire disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to electronic devices, and more particularly, to a system and method that notifies a target user of events that occurred in a variety of electronic devices located in a certain area.

2. Description of the Related Art

Electronic devices may be categorized into, for example, home appliances, office appliances, medical devices, and industrial devices. Examples of electronic devices include televisions (TVs), refrigerators, washing machines, personal computers, electric fans, air-conditioners, Digital Versatile Disc (DVD) players, external loudspeakers, game devices, steam boilers, and light controllers.

Electronic devices may be connected to each other in a certain area (e.g., a home, an office, or a hospital) based on an Internet Protocol (IP), via a media system such as a gateway (GW), which forms a network (e.g., a home network). As such, when electronic devices are connected with a network including the media system, an electronic device managing system controls the electronic devices via an external device (e.g., a remote controller) connected to the media system in wireless/wired mode. The electronic device managing system allows users to control a variety of electronic devices in a certain area.

The conventional electronic device managing system allows users to control electronic devices in a network via external devices. If users wish to check use/operation states of respective electronic devices in a home network, they must directly check the corresponding electronic devices or they may roughly check via the gateway. Therefore, when network environments are developed such that a network is configured with a number of electronic devices, it may be difficult for users to check the state of each electronic device due to the electronic device managing system. In particular, if a user is outside of the area where electronic devices form a home network, the electronic device managing system does not allow the user to check the states of the electronic devices.

A conventional system may transmit messages reporting the operation states of electronic devices to all users who use them in the home network or to a pre-designated user. These messages let corresponding users acquire the related information. However, since a message transmitting system unconditionally transmits messages related to electronic devices to users without considering current user situations, the users may receive unnecessary messages. In addition, users may become overloaded by the number of messages transmitted by the message transmitting system.

SUMMARY OF THE INVENTION

The present invention has been made to address at least the above problems and/or disadvantages and to provide at least the advantages described below. Accordingly, an aspect of the present invention provides a system and method that can feed back, to a user, information regarding a variety of events that occur when electronic devices operate.

Another aspect of the present invention provides a system and method that can selectively transmit messages corresponding to events that occur when electronic devices operate to an optimal user, considering the users' situations, via an optimal notification mode.

An additional aspect of the present invention provides a system and method that can perform selective transmission of messages corresponding to events that occur when electronic devices operate, considering a variety of factors, such as, for example, a type of event, a target user, a location of a target user, a type of electronic device that a target user uses, and a state of target electronic device.

A further aspect of the present invention provides a system and method that selectively feedback messages corresponding to events that occur when electronic devices operate, to a target user that can most properly process a corresponding event, via an optimal notification mode, considering users' situations, thereby reducing unnecessary messages and enhancing user convenience.

Another aspect of the present invention provides a system and method that can perform a selective transmission of messages when electronic devices operate, thereby preventing unnecessary messages from being created and transmitted, which prevents overloading the system managing electronic devices.

In accordance with an embodiment of the present invention, a method is provided for transmitting messages related to operations of electronic devices. A management apparatus is notified of an event that occurred in a specific one of a plurality of electronic devices. The management apparatus determines one or more target devices in response to notification of the event that occurred in the specific electronic device. An event message corresponding to the event that occurred in the specific electronic device is created. The management apparatus transmits the event message to the one or more target devices. The one or more target devices output the received event message.

In accordance with another embodiment of the present invention, a method is provided for transmitting messages related to operations of electronic devices. An event notification message is received reporting that an event occurred in a specific electronic device. A type of the event is determined based on the event notification message. A target user who uses the specific electronic device is extracted, when the type of the event has a low level of urgency. All target users that can receive a message reporting the event are extracted, when the type of the event has a high level of urgency. One or more target devices are determined based on the extracted one or more target users. The message reporting that the event occurred in the specific electronic device is transmitted to the one or more target devices.

In accordance with another embodiment of the present invention, a method is provided for transmitting messages related to operations of electronic devices. An alarm signal is output based on reception of an event message from a management apparatus. It is determined whether a user has checked the received event message. A message informing that the user has checked the received event message is created and the message is transmitted to the management apparatus, when the user has checked the received event message. The event message is output, when the user has checked the received event message. A user interface for forwarding the event message is output according to a

request of the user. A specific target, to which the event message is to be forwarded, is selected via the user interface. The event message is forwarded to the specific target.

In accordance with another embodiment of the present invention, there is provided a computer-readable recording medium on which a program for executing the method in a processor is recorded.

In accordance with another embodiment of the present invention, a message transmitting system is provided. The system includes a plurality of electronic devices. The system also includes a management apparatus for identifying an electronic device where an event occurs, determining one or more target devices to report the event that occurred in the electronic device, and transmitting an event messages based on the event to the one or more target devices. The system further includes the one or more target electronic devices for outputting the event message from the management apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features and advantages of the present invention will be more apparent from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a diagram illustrating a configuration of a system for managing electronic devices, according to an embodiment of the present invention;

FIG. **2** is a flowchart illustrating a method for transmitting messages according to events that occurred in electronic devices, according to an embodiment of the present invention;

FIG. **3** is a schematic block diagram illustrating a management apparatus, according to an embodiment of the present invention;

FIG. **4** is a flowchart illustrating a method for feeding back, to a user, signals corresponding to events that occurred in electronic devices, in a management apparatus, according to an embodiment of the present invention;

FIG. **5** is a flowchart illustrating a method for determining a target device to which an event message is transmitted, in a management apparatus, according to an embodiment of the present invention;

FIG. **6** is a schematic block diagram illustrating user equipment, according to an embodiment of the present invention;

FIG. **7** is a flow chart illustrating a method for forwarding messages to user equipment, according to an embodiment of the present invention; and

FIG. **8** illustrates screens showing user interfaces for forwarding messages to user equipment, according to an embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE PRESENT INVENTION

Embodiments of the present invention are described in detail with reference to the accompanying drawings. The same or similar components may be designated by the same or similar reference numerals although they are illustrated in different drawings. Detailed descriptions of constructions or processes known in the art may be omitted to avoid obscuring the subject matter of the present invention.

Embodiments of the present invention relate to a system and method that support a feedback function with respect to events that occur when a variety of electronic devices forming a network in a certain area (e.g., a home network, or an office network) operate, and thus, manage the electronic devices. When events occur while electronic devices operate, the system and method can determine a target electronic device to which an event message, indicating that the events have occurred, is transmitted. This determination is based on a variety of situations such as, for example, a type of event, a target user, a location of a target user, a type of electronic device that a target user uses, and a state of a target electronic device. A target device includes one or more pieces of user equipment used by corresponding target users and other devices that the target user uses. The event message is transmitted to a determined target device. A feedback function is executed, with respect to an optimal user who receives an event according to the operation of an electronic device, via an optimal notification mode.

In the following description, a network refers to a network environment where a variety of electronic devices are connected, based on Internet Protocol (IP), to a management apparatus, and are integrally managed thereby. That is, the network environment includes a number of electronic devices that are connected to each other via a network in a certain area (e.g., a house, an office, a hospital, a factory, etc.). The system according to the invention includes a number of electronic devices, a management apparatus, and a piece of user equipment.

The user equipment receives event messages from a management apparatus and forwards the event messages to one or more target users according to the user's selection. If a target user receives an event message but has difficulty processing the corresponding event that occurred in an electronic device, the target user can select more proper user of the other users and forward the event message thereto, thereby rapidly processing events that occurred in electronic devices.

The following description provides a management apparatus and a piece of user equipment in a configuration of the system, and methods for controlling the operations, in accordance with the accompanying drawings. It should be understood that the present invention is not limited to the following embodiments. As described herein, there may be many modifications from the embodiments of the present invention.

FIG. **1** is a diagram illustrating a configuration of a system for managing electronic devices, according to an embodiment of the invention.

Referring to FIG. **1**, the electronic device managing system includes a number of electronic devices **100**, a management apparatus **200**, and a user equipment **300**.

The electronic devices **100** include, for example, home appliances used in homes, office appliances used in offices, medical devices used in hospitals, and industrial devices used in factories. Examples of the electronic devices include TV sets, refrigerators, washing machines, computers (e.g., laptop computers and desktop computers), electric fans, air-conditioners, Digital Versatile Disc (DVD) players, audio players, external loudspeakers, game devices, steam boilers, boiler controllers, light controllers, microwave ovens, gas stoves, Digital Signage (DS), Large Format Displays (LFDs), digital cameras, electric cleaners, security devices (e.g., Closed-Circuit Television (CCTV)), and projectors. The electronic devices **100** may be arranged in a range of sectors, such as, for example, a home, an office, a hospital, and a factory, according to the features of the electronic devices **100**. The electronic devices **100** are connected to the management apparatus **200** via a wireless or wired interface. In an embodiment of the present invention, the electronic devices **100** are connected to the man-

agement apparatus **200** via an IP-based wired interface. The electronic devices **100** provide device information to the management apparatus **200** according to requests, and perform operations according to the control of the management apparatus **200**.

The electronic devices **100** create event messages according to their operations, and transmit the event messages to the management apparatus **200**. For example, if a washing machine has completed its washing cycle, it creates a message corresponding to a washing cycle completion (i.e., a washing cycle completion event), and transmits the message to the management apparatus **200**. If an air-conditioner requires a clean filter, the air-conditioner creates a message corresponding to a request for the replacement of the filter (i.e., a filter replacement event), and transmits the message to the management apparatus **200**. If a refrigerator is turned off by a malfunction, the refrigerator creates a message reporting that the refrigerator is turned off (i.e., an electric-power break-down event), and transmits the message to the management apparatus **200**. The conditions of the presence of events in the electronic devices **100** may be determined according to when the electronic devices **100** are manufactured or may be defined according to user settings. The electronic devices **100** receive event messages from the management apparatus **200**, and display state information on screen interfaces of electronic devices where the events occurred, according to the received event messages.

The management apparatus **200** controls the operation of the electronic devices **100**. The management apparatus **200** identifies events that occur in the electronic devices **100** and creates corresponding messages. The management apparatus **200** determines one or more target devices that will receive the created event messages (e.g., one or more pieces of user equipment of target users and/or one or more devices other than the user equipment), and transmits the event messages to the determined target device(s).

The management apparatus **200** receives messages reporting that events have occurred, from one or more electronic devices **100**. The management apparatus **200** analyzes the received event notification messages, determines a target device to detect the presence of the events of a corresponding electronic device, and creates the event message. The management apparatus **200** transmits the created event message to the determined target device. In an embodiment of the invention, the management apparatus **200** determines a target device, considering a variety of factors, such as, for example, a type of electronic device that has transmitted an event notification message, a type of event, a location of a target user, and a state of a target electronic device. The target device includes one or more pieces of user equipment of target users and/or one or more electronic devices. Determining target devices by the management apparatus **200** includes determining an optimal user to which state information should be fed back according to the presence of events in the electronic devices **100**, and determining an optimal device for feeding back to the determined user.

The management apparatus **200** may check electronic devices that are currently operating without an event notification message transmitted from the electronic devices **100**, indentify the events that occurred, create the corresponding event messages, and transmit them thereto. For example, the management apparatus **200** checks electronic devices that are currently operating and identifies whether the events (e.g., the operation completion of corresponding electronic devices, the detection of errors, the detection of an electric power outage, etc.) occur. If the management apparatus **200** ascertains that an event has occurred, it determines a target device to which the event is fed back, creates the event message, and transmits the event message to the determined target device. The operation of and the control method for the management apparatus **200** are described in greater detail below.

The user equipment **300** can control the electronic devices **100**, respectively, in a wireless interface mode. For example, the user equipment **300** may serve as a remote controller in order to remotely control the electronic devices **100**, respectively. The user equipment **300** is connected to the management apparatus **200**, via a wireless interface, and controls the electronic devices **100** respectively or in a group, via the management apparatus **200**. The wireless interface supported by the user equipment **300** may employ short-range communication protocols, such as, for example, Radio Frequency Identification (RFID), Bluetooth, Near Field Communication (NFC), Infrared Data Association (IrDA), and Zigbee. Alternatively, the user equipment **300** may also employ an IP-based wireless interface (e.g., an interface supporting a Wi-Fi communication standard) or a mobile-communication based wireless interface (e.g., an interface for supporting a 3G or 4G communication standard), in order to support the communication with the management apparatus **200**.

The user equipment **300** receives event messages from the management apparatus **200**, and displays them on a screen interface. The user equipment **300** may also provide a user interface in order to support a function for forwarding received event messages. The user interface supported by the user equipment **300** is described in greater detail below. The operation of the user equipment **300** will also be described in greater detail below.

As described above, the electronic device managing system can feed back state information regarding one or more electronic devices in a certain area, where events occurred, to an optimal user, via an optimal target device, via the management apparatus **200** connected to a number of electronic devices **100**.

FIG. **2** is a flowchart illustrating a method for transmitting messages according to events that occurred in electronic devices, according to an embodiment of the present invention.

Referring to FIG. **2**, an electronic device **110** detects an event that occurred, in step **201**. For example, if the electronic device **110** is a washing machine, it detects an event corresponding to a washing cycle completion (i.e., a washing cycle completion event). If the electronic device **110** is an air-conditioner, it detects an event corresponding to a request for the replacement of the filter (i.e., a filter replacement event). If the electronic device **110** is a refrigerator, it detects an event corresponding to an electric power outage (i.e., an electric-power break-down event). It should be understood that the invention is not limited by the types of events listed above. There are a variety of events that may occur in the electronic devices.

When the electronic device **110** detects the presence of an event at step **201**, it creates a message reporting the presence of the event (i.e., an event notification message), in step **203**. For example, if the electronic device **110** is a washing machine, it creates an event notification message for reporting that washing cycle has been completed. If the electronic device **110** is an air-conditioner, it creates an event notification message for reporting that the replacement of the filter is required. If the electronic device **110** is a refrigerator, it creates an event notification message for reporting a breakdown according to an electric power outage. The event notification message includes an identifier, indicating that

the event notification message reports the presence of the event that occurred in the electronic device **110**, in a header field, and the state information (e.g., washing cycle completion, filter cleaning, breakdown, etc.) regarding the event that occurred in the electronic device, in a data field.

After creating the event notification message at step **203**, the electronic device **110** transmits the event notification message to the management apparatus **200**, in a wireless or wired mode, in step **205**.

The management apparatus **200** analyzes the received event notification message, in step **207**, by identifying the type of electronic device transmitting the message and determining whether the received message corresponds to the event notification message. The event notification message is identified by analyzing the identifier in the header field.

When identifying the event notification message at step **207**, the management apparatus **200** determines a target device to which the event that occurred in the electronic device **110** is to be reported, in step **209**. In an embodiment of the present invention, the target device includes one or more pieces of user equipment of primary users who use the electronic device **110** (i.e., target users) or one or more electronic devices. The management apparatus **200** determines one or more target devices for reporting the presence of events, considering a variety of situations, such as, for example, the type of event (e.g., the urgency of the event that occurred), a target user (e.g., one or more primary users who use electronic devices where the event occurred, such as the electronic device **110**), a location of a target user, a type of electronic device that a target user uses, and a state of a target electronic device. In an embodiment of the present invention, as shown in FIG. **2**, it is assumed that the target device is user equipment **310**, and an electronic device **120**, selected from a number of pieces of user equipment **310**, **320** and **330** and a number of electronic devices **100**. The process of determining a target device by the management apparatus **200** is described in greater detail below.

After determining a target device at step **209**, the management apparatus **200** creates an event message for reporting the event that occurred in the electronic device **110** via the target device, in step **211**. The event message includes an identifier, indicating that the message serves to report the presence of the event that occurred in the electronic device **110**, in the header field. The event message also includes information regarding the electronic device **110** where the event occurred and the state information for reporting the content of the event, in the data field. The state information may be input to the data field, by referring to a data field of the event notification message transmitted from the electronic device **110** or the content of the message (i.e., state information) in a preset mapping table (see Table 2). The data field may further include command codes for controlling the output of event messages.

After creating the event message at step **211**, the management apparatus **200** transmits the event message to the determined target devices (e.g., the electronic device **120** and a piece of user equipment **310**) respectively, in steps **213** and **215**.

The electronic device **120** and the user equipment **310** output the received event message in a screen mode and/or in a voice mode, in steps **217** and **219**. For example, if the electronic device **120** is a TV set, the electronic device **120** outputs the received event message on the screen and via a speaker simultaneously, or alternatively in one of the two modes, according to the command code. Likewise, if the electronic device **120** is an audio system, it can output the received event message in a voice mode. The user equipment **130** outputs the received event message on the screen as a default, and further optionally outputs the message in a voice mode

In the following description of embodiments of the present invention, the process of determining a target device by the management apparatus **200** is described with reference to Table 1.

TABLE 1

	Types of electronic devices		
	Washing machine	Air-conditioner	Refrigerator
Content of Message	Washing cycle completion	Require filter cleaning	Electric power malfunction due to breakdown
Urgency	Low	Low	Low
Primary user of electronic device	User A	User A User B	User A User B
Location of primary user	Indoors	User A: outdoors User B: indoors	User A: outdoors User B: indoors
State of electronic device used by primary user	TV: ON User equipment: ON	TV: ON User equipment: ON	TV: ON User A's equipment: ON User B's equipment: ON
Result	Transmit the washing cycle completion message to TV and User A's equipment	Transmit the message for requiring the filter to be cleaned to User B's equipment	Transmit the refrigerator breakdown message to TV, User A's equipment, and User B's equipment

As shown in Table 1, determining a target device is explained with reference to the electronic device **110** embodied as a washing machine, an air-conditioner or a refrigerator. If the electronic device **110** is set as a washing machine, it transmits an event notification message according to a washing cycle completion to the management apparatus **200**. The management apparatus **200** identifies the type of electronic device (e.g., a washing machine) and detects the type of event (e.g., urgency) regarding the event that has occurred in the electronic device (e.g., a washing cycle completion event).

The types of events that may occur for the types of electronic devices may be preset in a mapping table in the management apparatus **200**. When the management apparatus **200** identifies a washing machine via the received event notification message, it determines whether the type of event for the washing machine corresponds to a high urgency or low urgency by referring to the mapping table.

If the management apparatus **200** ascertains that the event that occurred in the electronic device corresponds to a low level of urgency, it identifies a target user who uses the washing machine as User A. Information regarding target users, according to the type of electronic device, may be preset in a mapping table, as shown below in Table 2.

TABLE 2

Types of electronic devices	Content of event	Type of event	Target user	Electronic device in use
Washing machine	Washing cycle completion	Low	User A	TV, Device
Air-conditioner	Filter requires cleaning	Low	User A User B	User A: TV, Device

TABLE 2-continued

Types of electronic devices	Content of event	Type of event	Target user	Electronic device in use
Refrigerator	Breakdown	High	User A User B	User B: TV, Device User A: TV, Device
Gas stove	Gas leakage	Very High	User A	User B: TV, Device TV, Device
. . .	. . .	. . .	. . .	. . .

When the management apparatus **200** identifies a target user (e.g., User A) of the washing machine, it may also detect the location of the target user. For example, the management apparatus **200** determines whether the user equipment of User A exists in the network. Specifically, the management apparatus **200** determines whether User A's equipment exists in a certain area (e.g., a home) where the apparatus **200** and a number of electronic devices, including User A's equipment, form a network. The management apparatus **200** may detect a signal transmitted from User A's equipment. When detecting the location of User A's equipment, the management apparatus **200** can also identify whether User A's equipment is located inside the network (e.g., indoors) or outside the network (e.g., outdoors).

After detecting the location of a target user, the management apparatus **200** detects the other types of electronic devices that the target user uses, which are referred to as target electronic devices. The target electronic devices include pieces of user equipment and a number of electronic devices **100**, other than the washing machine, which are used by the target user. For example, the management apparatus **200** can detect an electronic device used by User A, as a target user, who uses the washing machine, by referring to the mapping table of Table 2. The management apparatus **200** can also check the state of the other electronic devices A (e.g., user equipment and TV) used by User A. Specifically, the management apparatus **200** can check whether the other electronic devices are turned on/off.

After analyzing the electronic devices as described above, the management apparatus **200** can determine the final target device and the final target user in order to report the events, based on an order of priority for a given situation. In an embodiment of the present invention, the priority has an order, e.g., a type of event (e.g., urgency)>location of a target user (indoors>outdoors)>a target electronic device used by a target user indoors and the state (On>Off). For example, if the management apparatus **200** ascertains that: the event that occurred in the washing machine has a low level of urgency; User A is indoors; and the types of electronic devices that User A uses are a piece of user equipment and a TV, it can determine that the user equipment and that TV are final target devices. Both the user equipment and the TV can be set as final target devices according to the user's settings. Alternatively, the user equipment or the TV can be set as a final target device according to the order of priority.

When determining a target device, the management apparatus **200** can also create an event message for reporting that a washing cycle completion event has occurred in the washing machine. The event message includes the state information, reporting that the washing machine has completed its washing cycle, in the data field. The state information may be input to the data field by referring to a data field of the event notification message transmitted from the washing machine or the content of message (i.e., state information) in a mapping table. The event messages may include an identifier, indicating that the transmitted message serves to report the presence of the event that occurred in the electronic device, in the header field. The data field may further include command codes for controlling the output of event messages.

The management apparatus **200** transmits the created event message to the finally determined target device (e.g., TV and User A's equipment). The target device (e.g., TV and User A's equipment) outputs the received event message, thereby notifying User A of the event that occurred in the washing machine. Outputting the event message is performed in a video mode via the screen and/or an audio mode via a speaker, according to type of electronic device that received the event message.

As described in Table 1, if the electronic device **110** is set as an air-conditioner, it transmits an event notification message, for the event requiring a clean filter, to the management apparatus **200**. The management apparatus **200** identifies the type of electronic device (e.g., an air-conditioner) via the received message. The management apparatus **200** detects the type of event (e.g., urgency) regarding the event that occurred in the electronic device, by referring to the mapping table.

If the management apparatus **200** ascertains that the event that occurred in the electronic device corresponds to a low level of urgency, it identifies target users who use the air-conditioner as User A and User B. Information regarding target users based on the type of electronic device may be acquired by referring to the mapping table.

When the management apparatus **200** identifies target users of the air-conditioner, it may also detect the locations of the target users. The management apparatus **200** can detect the locations of the target users (e.g., User A and User B) using the same method as described with respect to the washing machine event. After detecting the locations of the target users (User A and User B), the management apparatus **200** detects types of other electronic devices that the target users use. The other electronic devices include pieces of user equipment and a number of electronic devices **100**, other than the air-conditioner, which are used by the target users. For example, the management apparatus **200** can detect electronic devices used by User A and User B, as target users, who use the air-conditioner, by referring to the mapping table of Table 2. The management apparatus **200** can also check the state of the other electronic devices (e.g., user equipment and TV) used by User B indoors. If User A is outdoors, since User A cannot use electronic devices other than the user equipment, the management apparatus **200** determines whether the other electronic devices used by User B indoors are turned on/off.

After analyzing the electronic devices as described above, the management apparatus **200** can determine the final target device and the final target user in order to report the event according to the order of priority for the given situation. In an embodiment of the present invention, the priority has an order, e.g., a type of event (e.g., urgency)>location of a target user (indoors>outdoors)>an electronic device used by a target user indoors and the state (On>Off). For example, if the management apparatus **200** ascertains that the event that occurred in the air-conditioner has a low level of urgency, it can identify the primary users, i.e., User A and User B. If the management apparatus **200** detects the locations of User A and User B, and identifies that User A is outdoors and User B is indoors, it can determine User B as a final target user according to the order of priority. The management appara-

tus **200** identifies electronic devices used by the final target user and checks whether they are turned on/off. For example, the management apparatus **200** detects the states of a TV and a piece of user equipment, used by User B indoors, and ascertains that the TV is turned off and the user equipment is turned on. Thus, the management apparatus **200** can determine pieces of user equipment from among the other electronic devices, which are used by User B and turned on, as final target devices.

When determining a target device, the management apparatus **200** can also create an event message for reporting that an event requiring a clean filter has occurred in the air-conditioner. The event message includes the state information, reporting that the air-conditioner requires the clean filter, in the data field. The state information may be input to the data field, by referring to a data field of the event notification message transmitted from the air-conditioner or the content of message (i.e., state information) in a mapping table. The event messages may include an identifier, indicating that the transmitted message serves to report the event that occurred in the electronic device, in the header field. The data field may further include command codes for controlling the output of event messages.

The management apparatus **200** transmits the created event message to the finally determined target device (e.g., User B's equipment). The target device (e.g., User B's equipment) outputs the received event message, thereby notifying User B of the presence of the event that has occurred in the air-conditioner.

As described in Table 1, if the electronic device **110** is a refrigerator, it may transmit an event notification message, based on an electric power outage due to a breakdown to the management apparatus **200**. The management apparatus **200** identifies the type of electronic device (e.g., a refrigerator) via the received message. The management apparatus **200** detects the type of event (e.g., urgency) regarding the event that occurred in the electronic device (e.g., a refrigerator), by referring to the mapping table.

If the management apparatus **200** ascertains that the event that occurred in the electronic device corresponds to a high level of urgency, it identifies all target users who can transmit event messages (e.g., User A and User B). Information regarding target users, according the types of electronic device, may be acquired by referring to the mapping table.

When the management apparatus **200** identifies target users of the refrigerator, it may also detect the locations of the target users. The management apparatus **200** detects the locations of the target users (e.g., User A and User B) using the same method as described above with respect to the washing machine. After detecting the locations of the target users (User A and User B), the management apparatus **200** detects the other types of electronic devices that the target users use. The other electronic devices include pieces of user equipment and a number of electronic devices **100** other than the refrigerator, which are used by the target users. For example, the management apparatus **200** can detect electronic devices used by User A and User B as target users, who use the refrigerator, by referring to the mapping table as described in Table 2. The management apparatus **200** can also check the state of the other electronic devices (e.g., user equipment and TV) used by User B indoors. If User A is outdoors, since User A cannot use the other electronic devices other than the user equipment, the management apparatus **200** determines whether the other electronic devices that are used indoors by User B are turned on/off.

After analyzing the electronic devices as described above, the management apparatus **200** can determine the final target device and the final target user in order to report the event. Since the management apparatus **200** ascertains that the type of the event that occurred in the electronic device corresponds to high urgency, it determines all users who were registered (e.g., User A and User B) as target users, and determines target devices according to whether they are indoors or outdoors. Specifically, when determining User A and User B as target users that transmit event messages, the management apparatus **200** determines the final target device by checking the states of the other electronic devices used indoors by User B. For example, as described in Table 1, the management apparatus **200** determines user equipment used outdoors by User A, user equipment used indoors by User B, and a TV used by User B, as the final target devices.

When determining target devices, the management apparatus **200** can also create an event message for reporting that an electric power outage event occurs in the refrigerator due to a breakdown. The event message includes state information, reporting that the electric power is cut off to the refrigerator due to the breakdown, in the data field. The state information may be input to the data field, by referring to a data field of the event notification message transmitted from the refrigerator or the content of message (i.e., state information) in a mapping table. The event messages may include an identifier, indicating that the transmitted message serves to report the presence of the event that occurred in the electronic device, in the header field. The data field may further include command codes for controlling the output of event messages.

The management apparatus **200** transmits the created event message to the finally determined target devices (e.g., User A's equipment, User B's equipment, and the TV used by User B). The target devices (e.g., User A's equipment, User B's equipment, and the TV used by User B) output the received event messages, thereby notifying User A and User B of the presence of the urgent event that occurred in the refrigerator.

FIG. **3** illustrates a schematic block diagram of a management apparatus, according to an embodiment of the present invention.

Referring to FIG. **3**, the management apparatus **200** includes a first communication unit **210**, a second communication unit **220**, an input unit **230**, a display unit **240**, a storage input **250** and a controller **260**. Although not shown in FIG. **3**, the management apparatus **200** may further include, for example, an audio processing unit with a microphone and a speaker, and a battery supplying electric power to the components.

The first communication unit **210** is connected to a number of electronic devices **100** via an IP-based wired interface, and communicates with the electronic devices **100**. The first communication unit **210** receives event notification messages from the electronic devices **100** and transfers the event notification messages to the controller **260**. The first communication unit **210** transmits event messages to the electronic devices **100** under the control of the controller **260**. In another embodiment of the present invention, the management apparatus **200** may be connected to the electronic devices **100** via a wireless interface mode, and may not require the first communication unit **210**. In that case, the management apparatus **200** uses the second communication unit **220** to wirelessly connect to the electronic devices **100**.

The second communication unit **220** is connected to the user equipment **300** via a wireless interface mode, and communicates with the user equipment **300** via the wireless interface mode. For example, the second communication unit **220** transmits event messages to the user equipment **300** under the control of the controller **260**. The second communication unit **220** may also be connected to the electronic devices **100** via a wireless interface mode, and communicate with the electronic devices **100** via the wireless interface mode. For example, the second communication unit **220** receives event notification messages from the electronic devices **100** and transfers the event notification messages to the controller **260**. The second communication unit **220** transmits event messages to the electronic devices **100** under the control of the controller **260**. The second communication unit **220** may be implemented with one or more short-range communication modules for supporting short-range communication, such as, for example, Bluetooth communication, Infrared communication, Radio Frequency Identification (RFID) communication, and Near Field Communication (NFC).

Although not shown in FIG. **3**, the management apparatus **200** may further include an RF communication unit for supporting IP-based Internet communication services or mobile communication services. In that case, the RF communication unit performs data transmission via IP-based communication or mobile communication. It should be understood that the present invention is not limited to the embodiment with first **210** and second **220** communication units and an RF communication unit. For example, the management apparatus **200** may be equipped with various types of communication units in order to communicate with the electronic devices **100** and the user equipment **300**.

The input unit **230** creates signals for operating the management apparatus **200**. The signals may include, for example, a signal for controlling the supply of electric power to the management apparatus **200**, signals for selecting one or more electronic devices, and signals for controlling the selected electronic devices. The signals are created according to a user's request. The signals created via the input unit **230** are transferred to the controller **260** and serve as commands for controlling the operations in the management apparatus **200**. The input unit **230** may be implemented with one or more of a keyboard, a keypad, key buttons, and a mouse device. If the display unit **240** is implemented with a touch screen, the input unit **230** may be embodied as a touch map displayed on the touch screen.

The display unit **240** displays the operation states of the management apparatus **200** and the screens related to the operations. For example, the display unit **240** displays a list of electronic devices **100** controlled by the management apparatus **200**. The display unit **240** may also display the electronic devices **100** that are enabled and disabled. The display unit **240** may also display, for example, an interface screen allowing the user to control one or more electronic devices, a screen showing information regarding electronic devices where events occur, and a screen showing the content of events (state information) that occurred in electronic devices. The display unit **240** may be implemented with, for example, a Liquid Crystal Display (LCD), Light Emitting Diodes (LEDs), Organic Light Emitting Diodes (OLEDs), or Active Matrix Organic Light Emitting Diodes (AMOLEDs). The display unit **240** may also be implemented with a touch-based interface. For example, the display unit **240** may be implemented with a touch screen. In that case, the touch screen senses user touches and transfers the corresponding signals to the controller **260**.

The storage input **250** stores data and application programs executed in the management apparatus **200**. The storage input **250** is implemented with one or more memory devices. In an embodiment of the present invention, the storage input **250** may be embodied as, for example, a Read Only Memory (ROM), a flash memory, a Random Access Memory (RAM), internal hard disks, external hard disks, or external storage devices. The storage input **250** stores an operating system for controlling the management apparatus **200**. The storage input **250** temporarily or permanently stores an application program for receiving signals corresponding to events that have occurred in electronic devices **100** and for managing or controlling the corresponding operations, and data related to the application program. The storage input **250** temporarily or permanently stores an application program for determining target devices in order to feed back events that have occurred in electronic devices, and data related to the application program. The storage input **250** temporarily or permanently stores an application program for transmitting event messages to the determined target devices, and data related to the application program. The storage input **250** can also store information related to the function for feeding back events that have occurred in electronic devices **100**, for example, mapping tables, and information regarding the order of priority to determine target devices.

The controller **260** controls the entire operation of the management apparatus **200**. The controller **260** controls operations for feeding back events that have occurred in the electronic devices **100** to a user. For example, the controller **260** controls the operations of the electronic devices **100**, and identifies target electronic devices where events occur. The controller **260** can determine a target device for reporting the presence of events, considering a variety of situations, such as, for example, types of events that have occurred in the target electronic devices, a target user, a location of a target user, a type of target electronic device, and a state of target electronic device. The controller **260** creates an event message to inform the user that an event has occurred in an electronic device and transmits the event message to the determined target device.

A detailed description of the controller **260** is provided in the following description with reference to the accompanying drawings.

FIG. **4** is a flow chart illustrating a method for feeding back, to a user, signals corresponding to events that occurred in electronic devices, in the management apparatus **200**, according to an embodiment of the present invention.

Referring to FIG. **4**, the controller **260** receives an event notification message from a specific one of the electronic devices, in step **401**. The controller **260** analyzes the event notification message to determine a type of the event corresponding to the received event notification message, in step **403**. For example, the controller **260** analyzes the received event notification message and identifies a type of the specific electronic device that transmitted the event notification message.

The controller **260** determines whether the type of event corresponds to an urgent event, in step **405**, by referring to the preset mapping table described above, for example.

If the controller **260** ascertains that the type of event has a low level of urgency, it extracts a target user who uses the specific electronic device where the event has occurred, in step **409**. If the controller **260** ascertains that the type of event has a high level of urgency, it extracts all target users who can perform transmission of a message with respect to the event (i.e., who can perform a feedback operation with

respect to the event), in step **407**, by referring to the mapping table described above, for example.

After extracting target users at steps **407** and **409**, the controller **260** determines target devices based on the extracted target users, in step **411**. For example, the controller **260** may determine one or more target devices to report the presence of event, considering a number of situations including, for example, a location of a target user, a type of target electronic device used by the target user, and a state of the target electronic device. A detailed description of determining target devices by the controller **260** is provided below with reference to FIG. **5**.

After determining the target devices at step **411**, the controller **260** creates an event message reporting the event that occurred in the electronic device, via the target devices, in step **413**. The controller **260** transmits the created event message to the determined one or more target devices, in step **415**.

Although not shown in FIG. **4**, the controller **260** may include a type of event, indicating the urgency of the event that occurred in the electronic devices, in the data field of the event message to be transmitted to user equipment used by a target user. If the controller **260** does not receive a reply message as to whether user equipment of the target user has received the event message, from the user equipment, it may process the transmission of an event message according to a re-determination of a target device. Alternatively, if the controller **260** has not received a reply message as to whether user equipment of the target user has received the event message, from the user equipment, it may re-transmit the event message. Alternatively, if the controller **260** receives a message indicating that user equipment of the target user has not checked the event message (i.e., a not-confirmed message), from the user equipment, it may re-determine a target device via the processes described above, and transmit the event message to the re-determined target device.

FIG. **5** is a flow chart illustrating a method for determining a target device to which an event message is transmitted, in a management apparatus, according to an embodiment of the present invention.

Referring to FIG. **5**, the controller **260** extracts a target user, in step **501**. For example, as described in FIG. **4**, the controller **260** extracts a target user based on the urgency indicated by a type of event.

After extracting a target user, the controller **260** detects the location of the extracted target user, in step **503**. For example, as described above with reference to Tables 1 and 2, the controller **260** searches for a target device of a target user and determines whether the target user is indoors or outdoors, or whether a number of target users are indoors or outdoors.

If the controller **260** ascertains that the target user is indoors, it identifies the other electronic devices that the target user uses, in step **505**. In addition, if the controller **260** ascertains that all the extracted target users are indoors, it can identify electronic devices used by the respective target users. The controller **260** detects the states of the identified electronic devices, in step **507**. For example, the controller **260** detects whether the identified electronic devices are turned on or off. The controller **260** identifies one or more target devices, based on the pieces of user equipment that one or more indoor target users use and one or more electronic devices that are turned on, in step **513**. For example, when a number of target users are indoors, the controller **260** determines, as target devices, pieces of user equipment used by the target users or user equipment used by a specific target user with the highest order of priority. The controller **260** then determines, as the final target device, all the electronic devices used by the target users or a specific electronic device with the highest order of priority, (e.g., an electronic device commonly used by the target users). Although not shown in FIG. **5**, the determination of the final target device may be performed in a different process, according to a type of event (i.e., urgency). For example, if an event has a low level of urgency, the controller **260** may determine that the electronic devices used by target users that are indoors are target devices. If an event has a high level of urgency, the controller **260** may determine that the electronic devices used by target users that are indoors and pieces of user equipment used by target users that are outdoors, are target devices.

If the controller **260** ascertains that target users are indoors and outdoors at step **503**, it can identify the other electronic devices used by a target user that is indoors (e.g., a first target user), in step **509**. Specifically, if the extracted target users are indoors and outdoors, the controller **260** can identify the other electronic devices used by the target user that is indoors. The controller **260** detects the states of the identified electronic devices, in step **511**. For example, the controller **260** detects whether the identified electronic devices are turned on or off. The controller **260** can determine a target device, based on pieces of user equipment, used by a target user that is indoors (first target user) and a target user that is outdoors (second target user), and electronic devices that are used by the first target user and turned on. The controller **260** can determine, as a final target device, user equipment used by a first target user and the other electronic device that is used by the first target user and turned on. Although not shown in FIG. **5**, the determination of the final target device may be performed in a different process, according to a type of event (i.e., urgency). For example, if an event has a low level of urgency, the controller **260** may determine that the electronic devices used by target users that are indoors are target devices. If an event has a high level of urgency, the controller **260** may determine that the electronic devices used by target users that are indoors and pieces of user equipment used by target users that are outdoors, are target devices.

If the controller **260** ascertains that the target user is outdoors, i.e., there are no target users indoors, at step **503**, the controller **260** determines the user equipment used by the target user as a final target device, in step **513**.

FIG. **6** is a schematic block diagram illustrating user equipment **300**, according to an embodiment of the present invention.

Referring to FIG. **6**, the user equipment **300** includes a communication unit **340**, a display unit **350**, a storage input **360**, and a controller **370**. Although not shown in FIG. **6**, it should be understood that the user equipment **300** may further include, for example, an audio processing unit with a microphone and a speaker, a digital broadcasting module for receiving digital broadcasts (e.g., mobile broadcasting, such as, Digital Multimedia Broadcasting (DMB), and Digital Video Broadcasting (DVB)), a camera module for acquiring still images or videos, an input unit with mechanical keys, a touch-based pad, and a battery supplying electric power to the components.

The communication unit **340** is connected to the electronic devices **100** via a wireless communication mode, and communicates with the electronic devices via the wireless communication mode. The communication unit **340** is implemented with one or more communication modules for supporting wireless communication, such as, for example,

Bluetooth communication, Infrared communication, RFID communication, Zigbee communication, NFC, and Wi-Fi communication. The communication unit **340** may also be wirelessly connected to the management apparatus **200** via the Internet or a mobile communication network. In that case, the communication unit **340** may include one or more communication modules for supporting IP-based Internet communication or mobile communication. It should be understood that the user equipment **300** is not limited to an embodiment where the communication unit **340** is implemented to include the communication modules or communication modes listed above. Specifically, the user equipment **300** may include various types of communication units to communicate with the electronic devices **100** and the management apparatus **200**. The communication unit **340** receives event messages from the management apparatus **200**, and transfers the event messages to the controller **370**.

The display unit **350** displays the operation states of the user equipment **300** and the screens related to the operations. For example, the display unit **350** displays a home screen of the user equipment **300**, or screens according to the execution of application programs. The display unit **350** also displays a screen in order to forward event messages transmitted from the management apparatus **200**. The display unit **350** displays a user interface screen that includes an area showing content of an event (state information), and an area allowing the user to select one or more items to be forwarded. The configuration of the user interface screen is described in greater detail below. The display unit **350** may be implemented with, for example, an LCD, LEDs, OLEDs, or AMOLEDs. The display unit **350** may also be implemented with a touch-based interface. For example, the display unit **350** may be implemented with a touch screen. In that case, the touch screen senses user touches and transfers the corresponding signals to the controller **370**.

The storage input **360** stores data and application programs executed in the user equipment **300**. The storage input **360** is implemented with one or more memory devices. In an embodiment of the invention, the storage input **360** is embodied as, for example, a ROM, a flash memory, a RAM, internal hard disks, external hard disks, and/or external storage devices. The storage input **360** stores an operating system for controlling the user equipment **300**. The storage input **360** temporarily or permanently stores an application program for receiving and outputting event messages, and data related to the application program. The storage input **360** temporarily or permanently stores an application program for forwarding received event messages, and the data related to the application program. The storage input **360** also stores information to execute the event message forwarding function, which includes, for example, a receiver's information, and a waiting period of time to check a received event message.

The controller **370** controls the entire operation of the user equipment **300**. The controller **370** controls the forwarding function of event messages that are transmitted from the management apparatus **200**. For example, the controller **370** receives event messages from the management apparatus **200** and outputs the event messages on the screen interface. If the controller **370** ascertains that the user has checked a received event message, it creates the reply message and transmits the reply message to the management apparatus **200**. The controller **370** also provides a user interface to forward received messages, which is described in greater detail below. The controller **370** identifies a target user that the user has selected via the user interface for forwarding event messages, and forwards the event message based on information regarding the identified target user. If the controller **370** ascertains that the user did not check a received event message within a preset waiting period of time, it re-informs the user that the event message has received or performs an automatic forward function. A detailed description of the controller **370** is provided below with reference to the accompanying drawings.

The user equipment **300**, according to an embodiment of the present invention, includes all information communication devices, multimedia devices, and their applications, which are operated according to communication protocols corresponding to various types of communication systems. For example, the user equipment **300** can be embodied as a mobile communication terminal, a tablet personal computer, a smartphone, a Portable Multimedia Player (PMP), a media player, a mobile game player, a laptop computer, or a Personal Digital Assistant (PDA).

FIG. **7** is a flow chart illustrating a method for forwarding messages in the user equipment **300**, according to an embodiment of the present invention. FIG. **8** illustrates screens showing user interfaces for forwarding messages in the user equipment **300**, according to an embodiment of the present invention.

Referring to FIGS. **7** and **8**, the controller **370** receives an event message from the management apparatus **200**, in step **701**. The controller **370** outputs an alarm signal informing that the event message has been received, in step **703**. The controller **370** determines whether the user has checked the received event message, in step **705**. When the controller **370** receives an event message, it may output an alarm signal informing that the event messages has been received via one or more of a variety of modes, such as, for example, a vibration mode, an audio output mode, and a screen display mode.

If the controller **370** ascertains that the user has checked the received event message, it creates a reply message informing that the user checked the received event message, and transmits the reply message to the management apparatus **200**, in step **707**. The controller **370** controls the display unit **350** to display a screen according to the user's checking operation, in step **708**. For example, when the controller **370** detects that the user has checked the received event message, it controls the display unit **350** to display the content of the event (state information) that occurred in a specific electronic device. As shown in screen **801** of FIG. **8**, the controller **370** controls the display unit **350** to display a pop-up window **800** showing a type of electronic device where the event occurred (e.g., a washing machine) and the content of the event (e.g., "Washing cycle has been completed"). The pop-up window **800** may further show a control item (e.g., OK button) for executing a message checking operation, and a control item (e.g., FORWARD button) for executing an event message forwarding function.

After displaying the event message the controller **370** detects a user's forward request, in step **709**. For example, if the user selects a control item for executing an event message forwarding operation on the pop-up window **800**, the controller **370** detects that the user has requested the event message forwarding function.

The controller **370** outputs a user interface supporting the forwarding function, in step **711**. For example, as shown in screen **803** of FIG. **8**, the controller **370** controls the display unit **350** to display a user interface that includes an first area **810** showing content of the event (state information) and a second area **830** allowing the user to select one or more items where the content is to be forwarded (e.g., a target device). As shown in screen **803**, an electronic device where

an event occurred (e.g., a washing machine) and the content of the event ("Washing cycle has been completed") are displayed on the first display area **810**. The user may correct the content of the event or add content to the first display area **810**. The second area **830** provides information regarding target users to whom event messages can be forwarded, and their location information. The second area **830** allows the user to select the target users. In addition, the user interface may further include a control item (e.g., FORWARD button) **850** allowing the user to execute the forwarding function to the selected target users and control item (e.g., CANCEL button) allowing the user to cancel the forward function.

Referring back to FIG. **7**, the user selects a target user to whom the event is to be forwarded via the user interface, in step **713**. The controller **370** determines whether a forward request is made with respect to an event message, in step **715**. For example, the user selects one or more target users to which the event message is forwarded via the user interface, and then operates the control item for executing the forwarding function. Therefore, the controller **370** determines whether the user operates the control item for executing the forwarding function via the user interface.

If the controller **370** ascertains that a forwarding request is not made with respect to an event message at step **715**, the methodology returns to step **711**. If the controller **370** ascertains that a forwarding request is made with respect to an event message at step **715**, the event message is forwarded, in step **717**. For example, the controller **370** may forward the received event message to user equipment used by the selected target user. Although not shown in FIG. **7**, an embodiment of the present invention may be implemented such that the controller **370** determines whether the event message is corrected, if the controller **370** ascertains that the event message is not corrected, it performs a forward operation based on the event message transmitted from the management apparatus **200**, and if the controller **370** ascertains that the event message is corrected, it performs a forward operation based on the event message that has been received.

If the controller **370** ascertains that the user has not checked the received event message at step **705**, it identifies the type of event, in step **719**. The controller **370** determines whether the type of event corresponds to an urgent event, in step **721**. For example, the controller **370** identifies whether the event message corresponds to an event with a high level of urgency or a low level of urgency.

If the controller **370** ascertains that the event that occurred in an electronic device has a low level of urgency, it performs an operation corresponding to the event, in step **723**. For example, after a preset period of time has elapsed, the controller **370** re-informs that the event message has been received, manages or stores the received event message in the user equipment until the user checks, and/or reports that the event message has not been checked to the management apparatus **200**.

If the controller **370** ascertains that the event that occurred in an electronic device has a high level of urgency, the controller **370** waits a preset period of time, in step **725**. The controller **370** detects whether the preset period of time has expired, in step **727**.

If the controller **370** ascertains that the preset period of time has not expired, the controller performs a corresponding operation, in step **729**. For example, the controller **370** continues to perform the counting operation or repeatedly outputs an alarm signal to inform that the event message has been received, until the preset waiting period of time elapses.

If the controller **370** ascertains that the preset period of time has expired, the controller creates a message indicating that the user has not checked the event message and transmits the message to the management apparatus **200**, in step **731**.

As described above, the system and method according to the present invention can selectively feed back information regarding events that have occurred when a number of electronic devices in a certain area operate, considering user situations. Specifically, the system and method can perform a selective transmission of messages regarding events that have occurred when electronic devices operate, considering user situations.

The system and method according to embodiments of the present invention can selectively transmit events that have occurred when electronic devices operate, considering a variety of situations, such as, for example, the types of events, the types of target electronic devices, the target users, the locations of target users, and the states of target electronic devices. Thus, corresponding events are fed back to the most proper target user via an optimal notification mode. The system and method according to embodiments of the present invention can perform a selective transmission of messages regarding events by electronic devices, thereby reducing the creation and transmission of unnecessary messages in the system, which prevents overloading of the system managing electronic devices.

The system and method according to embodiments of the present invention can execute a feedback function in a variety of environments (e.g., houses, offices, hospitals, factories, etc.), where a number of electronic devices form a network. The system and method can notify an optimal user of events that occurred when electronic devices operate in a variety of environments, in an optimal notification mode, where the optimal user can optimally process corresponding events. The system and method can provide an optimal environment where events that occurred when electronic devices operate can be optimally processed. The system and method can allow users to efficiently and easily control electronic devices in a network.

As described above, the system and method for transmitting messages related to the operations of electronic devices, according to embodiments of the present invention can be implemented with program commands that can be conducted via various types of computers and recorded in computer-readable recording media. The computer-readable recording media contain program commands, data files, data structures, or the like, or a combination thereof. The program commands recorded in the recording media may be designed or configured to comply with the invention, or may be software well-known to the ordinary person skilled in the art.

The computer-readable recoding media includes hardware systems for storing and conducting program commands. Examples of the hardware systems may include magnetic media such as a hard disk, a floppy disk, a magnetic tape, optical media such as a CD-ROM and a DVD, Magneto-Optical Media such as a floptical disk, a ROM, a RAM, and a flash memory. The program commands include assembly language or machine code complied by a complier and a higher level language interpreted by an interpreter. The hardware systems may be implemented with at least one software module to comply with embodiments of the present invention.

While the invention have been shown and described with reference to certain embodiments thereof, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A method for transmitting messages related to operations of electronic devices, the method comprising;

receiving, at a management apparatus, an event notification message from a specific electronic device where an event occurs;

analyzing, at the management apparatus, the event notification message;

determining, at the management apparatus, one or more target devices, which are registered as target users of the specific electronic device, to report the event that occurred in the specific electronic device; and

transmitting, at the management apparatus, an event message corresponding to the event that occurred in the specific electronic device to the determined one or more target devices,

wherein the target devices are determined based on whether the one or more target devices are located indoors or outdoors.

2. The method of claim **1**, wherein analyzing the event notification message comprises at least one of:

identifying a type of the specific electronic device transmitting the event notification message;

identifying a type of event corresponding to the event notification message;

identifying a target user according to the type of event;

identifying a type of an electronic device that the target user uses; and

identifying a state of the electronic device that the target user uses.

3. The method of claim **2**, wherein determining the one or more target devices comprises determining the one or more target devices based on at least one of an urgency of the event that occurred, the target user, a location of one or more another electronic devices, the type of the one or more another electronic devices, or a state of the one or more another electronic devices.

4. The method of claim **3**, wherein determining the one or more target devices comprises determining the one or more target devices based on an order of priority relating to an urgency of the event, the location of the one or more another electronic devices, a type of the target electronic device, and the state of the one or more another electronic devices.

5. The method of claim **3**, wherein identifying a target user comprises:

extracting information on a target user who uses the specific electronic device from the event notification message if the event has a first level of urgency; and

extracting information on all target users who receive a message reporting the event if the event has a second level of urgency.

6. The method of claim **5**, wherein determining the one or more target devices comprises:

detecting a location of each of the one or more another electronic devices that target users use; and

when the one or more another electronic devices are located indoors, determining which of the one or more another electronic devices used by the target users are turned on.

7. The method of claim **6**, wherein determining the one or more target devices comprises:

when the one or more another electronic devices of target users comprise a plurality of target users which are located both indoors and outdoors, determining which of the one or more turned on another electronic devices used by at least one of the plurality of target users is located indoors; and

when the one or more another electronic devices are located outdoors, determining pieces of user equipment used by the target users.

8. The method of claim **6**, wherein the one or more target device comprises at least one of a piece of the specific electronic device, which is used by a target user.

9. The method of claim **1**, wherein the event message comprises:

an identifier indicating that the event message reports the event that occurred in the specific electronic device; and

state information reporting information regarding the specific electronic device where the event has occurred, and reporting content of the event that occurred in the specific electronic device.

10. A management apparatus comprising:

a communication module configured to support communication with a plurality of electronic devices; and

a controller configured to:

receive, at the management apparatus, an event notification message from a specific electronic device where an event occurs;

analyze, at the management apparatus, the event notification message;

determine, at the management apparatus, one or more target devices, which are registered as target users of the specific electronic device, to report the event that occurred in the electronic device; and

transmit, at the management apparatus, an event message corresponding to the event that occurred in the specific electronic device to the determined one or more target devices,

wherein the target devices are determined based on whether the one or more target devices are located indoors or outdoors.

11. The management apparatus of claim **10**, wherein the controller is further configured to at least one of:

identify a type of the specific electronic device transmitting the event notification message;

identify a type of event corresponding to the event notification message;

identify a target user according to the type of event;

identify a type of an electronic device that the target user uses; and

identify a state of the electronic device that the target user uses.

12. The management apparatus of claim **10**, wherein the controller is further configured to determine the one or more target devices based at least one of an urgency of the event that occurred, the target user, a location of one or more another electronic devices, the type of the one or more another electronic devices, and a state of a target electronic device.

13. The management apparatus of claim **12**, wherein the controller is further configured to determine the one or more target devices according to an order of priority relating to the urgency of the event, the location of the one or more another electronic devices, the type of the one or more another electronic devices, and a state of the one or more another electronic devices.

14. The management apparatus of claim 12, wherein the controller is further configured to:

detect a location of each of the one or more another electronic devices that target users use; and

when the one or more another electronic devices are located indoors, determining which of the one or more another electronic devices used by the target users are turned on.

15. The management apparatus of claim 12, wherein the controller is further configured to:

determine, when the one or more another electronic devices of target users comprise a plurality of target users that are located both indoors and outdoors, which of the one or more turned on another electronic devices used by at least one of the plurality of target user is located indoors; and

when the one or more another electronic devices are located outdoors, determine pieces of user equipment used by the target users as the one or more target devices.

16. The management apparatus of claim 10, wherein the controller is further configured to:

extract information on a target user who uses the specific electronic device from the event notification message if the event has a first level of urgency; and

extract information on all target users who receive a message reporting the event if the event has a second level of urgency.

* * * * *