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(54) **NETWORK MANAGEMENT DEVICE AND METHOD**

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(57) **ABSTRACT**

A network management device including: a first communication interface configured to receive a control command to be transmitted to a destination device among a plurality of service providing devices included in a network; a command manager configured to generate, based on the control command, a dedicated command for the destination device based on the control command being a common command to be transmitted to at least some of the plurality of service providing devices; and a second communication interface configured to transmit the dedicated command to the destination device.

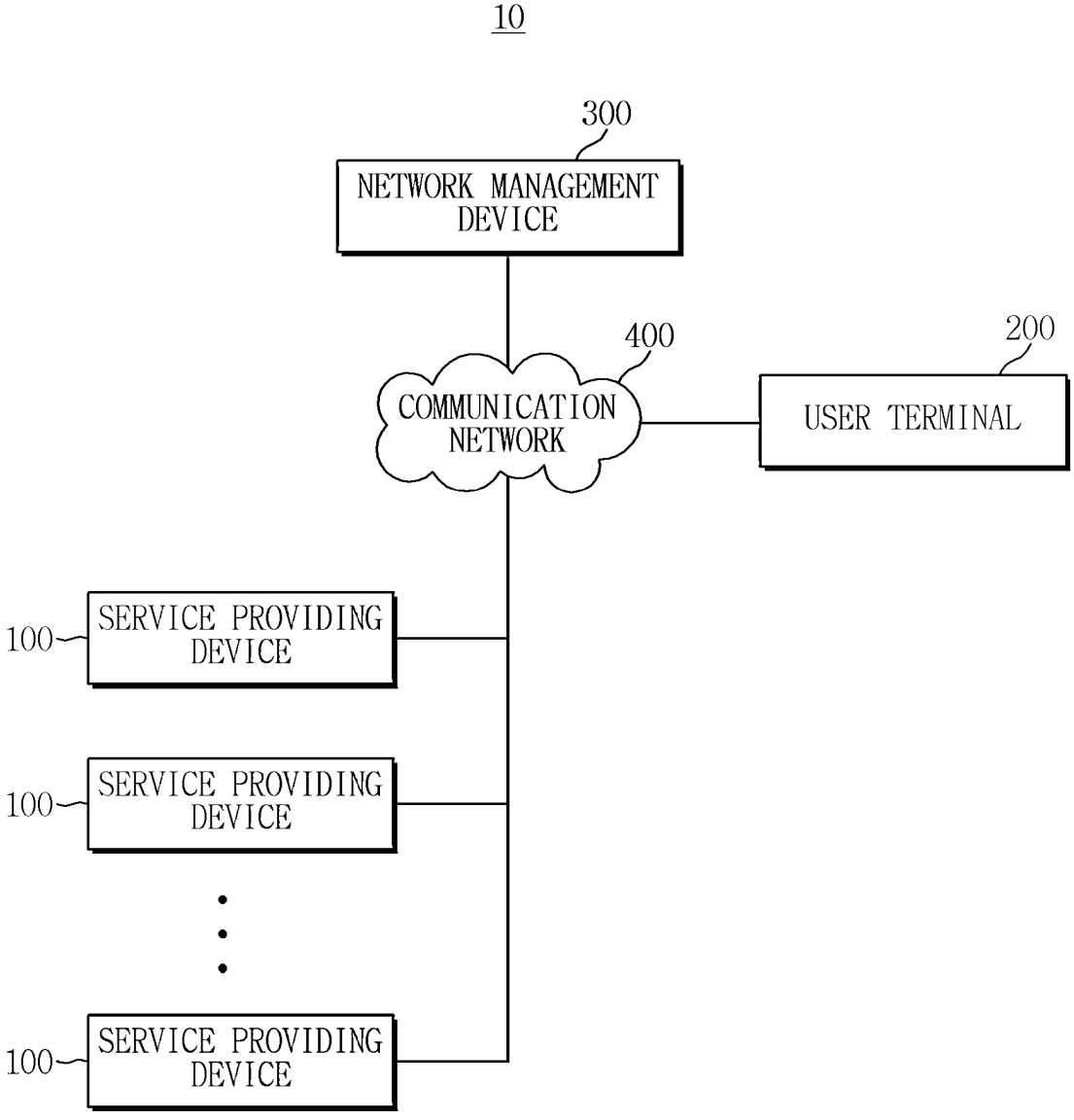


FIG. 1

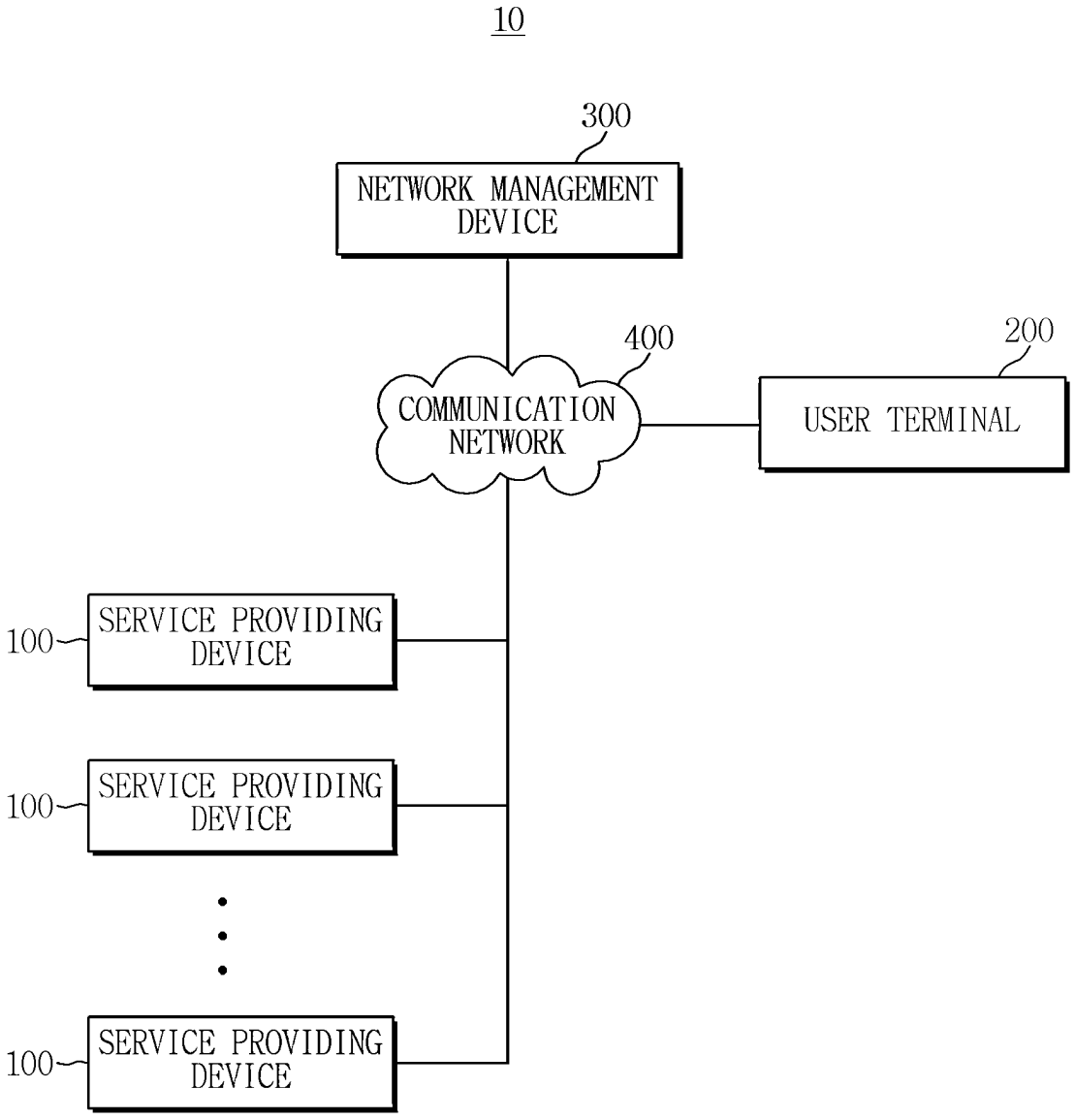

10
300
NETWORK MANAGEMENT DEVICE
400
COMMUNICATION NETWORK
200
USER TERMINAL
100
SERVICE PROVIDING DEVICE
100
SERVICE PROVIDING DEVICE
100
SERVICE PROVIDING DEVICE

FIG. 2

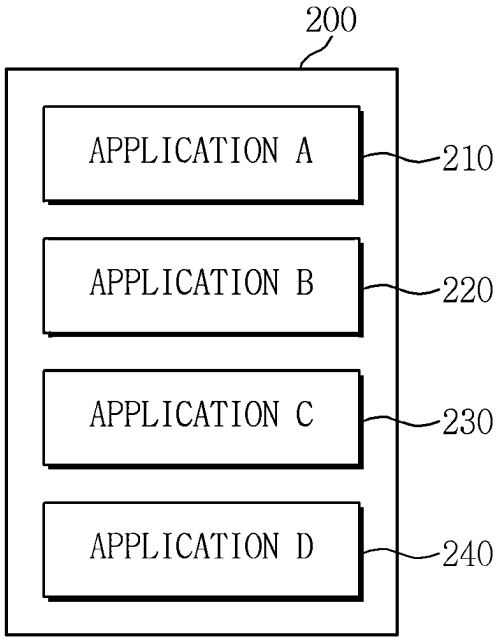

200
APPLICATION A
210
APPLICATION B
220
APPLICATION C
230
APPLICATION D
240

FIG. 3

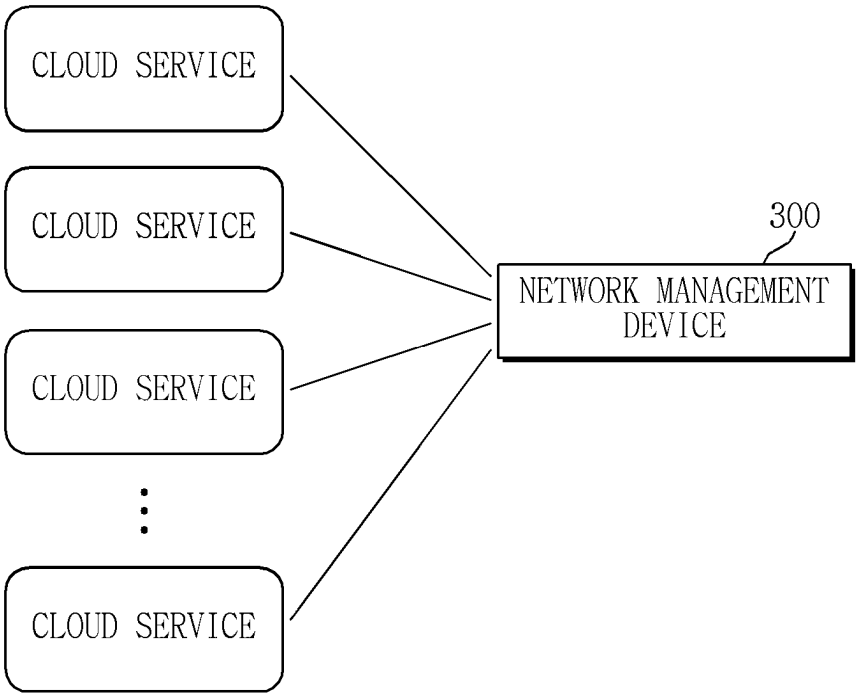

CLOUD SERVICE
CLOUD SERVICE
CLOUD SERVICE
CLOUD SERVICE
300
NETWORK MANAGEMENT DEVICE

FIG. 4

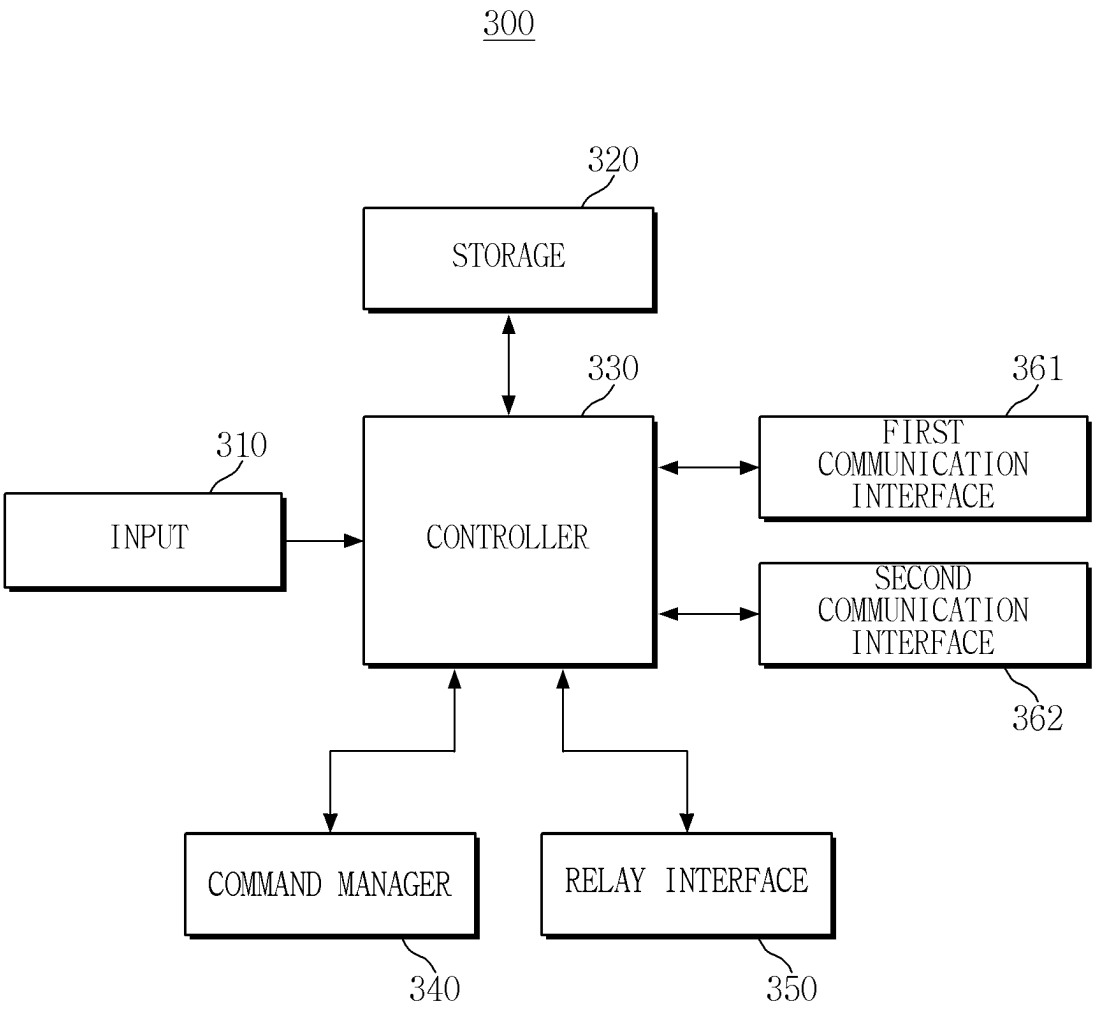

300
320
STORAGE
330
361
FIRST COMMUNICATION INTERFACE
310
INPUT
CONTROLLER
SECOND COMMUNICATION INTERFACE
362
COMMAND MANAGER
RELAY INTERFACE
340
350

FIG. 5

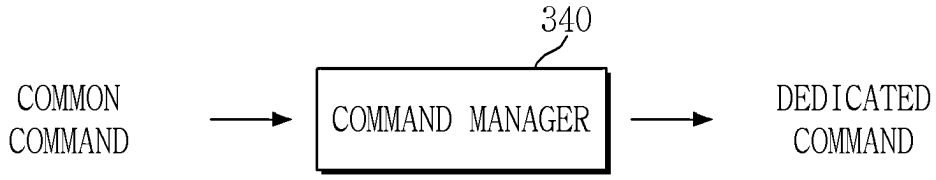


FIG. 6

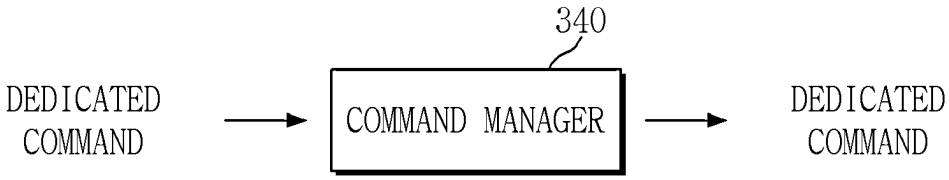


FIG. 7

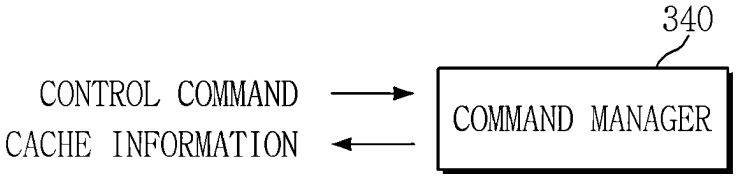


FIG. 8

500

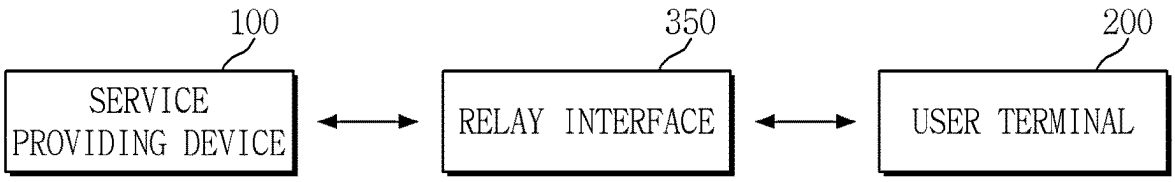
510 COMMON COMMAND	520 IDENTIFICATION INFORMATION	530 DEDICATED COMMAND
COMMON COMMAND 1	IDENTIFICATION INFORMATION A	DEDICATED COMMAND 1A
	IDENTIFICATION INFORMATION B	-
	IDENTIFICATION INFORMATION C	DEDICATED COMMAND 1C
	IDENTIFICATION INFORMATION D	DEDICATED COMMAND 1D
COMMON COMMAND 2	IDENTIFICATION INFORMATION A	-
	IDENTIFICATION INFORMATION B	DEDICATED COMMAND 2B
	IDENTIFICATION INFORMATION C	DEDICATED COMMAND 2C
	IDENTIFICATION INFORMATION D	-
⋮	⋮	⋮

FIG. 9

600

610	620
IDENTIFICATION INFORMATION	DEDICATED COMMAND
IDENTIFICATION INFORMATION A	DEDICATED COMMAND Aa
	DEDICATED COMMAND Ab
	DEDICATED COMMAND Ac
	⋮
IDENTIFICATION INFORMATION B	DEDICATED COMMAND Ba
	DEDICATED COMMAND Bb
	DEDICATED COMMAND Bc
	⋮
⋮	⋮

FIG. 10


100
SERVICE PROVIDING DEVICE
350
RELAY INTERFACE
200
USER TERMINAL

NETWORK MANAGEMENT DEVICE AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based on and claims priority from Korean Patent Application No. 10-2024-0022775 filed on Feb. 16, 2024 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND

1. Field

[0002] The present disclosure relates to a network management device and method, and more particularly, to a network management device and method for relaying control commands between a service providing device and a user terminal existing on the network.

2. Description of the Related Art

[0003] Users may receive services from service providing devices existing on a network. For example, the service providing device may be a camera. The video captured by the camera may be transmitted to a user terminal through the network, and the user may check the scene through the video output from the user terminal.

[0004] A plurality of service providing devices may exist on the network. At least some of the plurality of service providing devices may perform different functions. For example, a plurality of service providing devices manufactured by different manufacturers may be included in the network, or service providing devices providing different functions by the same manufacturer may be included in the network.

[0005] Since different service providing devices operate by different commands, one device may not able to integrate and manage different service providing devices.

[0006] Therefore, there is a need for technology that enables integrated management of different service providing devices.

SUMMARY

[0007] Provided is a network management device and method that relays control commands between a service providing device and a user terminal existing on the network.

[0008] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the presented embodiments.

[0009] According to an aspect of the disclosure, a network management device may include: a first communication interface configured to receive a control command to be transmitted to a destination device among a plurality of service providing devices included in a network; a command manager configured to generate, based on the control command, a dedicated command for the destination device based on the control command being a common command to be transmitted to at least some of the plurality of service providing devices; and a second communication interface configured to transmit the dedicated command to the destination device.

[0010] The common command may include: a control command for an operation that is performed by the at least some of the plurality of service providing devices, where the dedicated command includes a control command that is not included in the common command.

[0011] Based on the control command being the dedicated command for the destination device, the second communication interface may transmit the control command to the destination device.

[0012] The command manager may further transmit cache information to a user terminal that transmits the control command.

[0013] The network management device may further include a relay interface configured to relay communication between a user terminal that transmits the control command and the destination device.

[0014] The relay interface may be further configured to relay the communication between the user terminal and the destination device based on whether the user terminal is authenticated.

[0015] The command manager may be further configured to, based on the control command, generate a dedicated command for each of a plurality of destination devices.

[0016] Based on a plurality of dedicated commands corresponding to the common command, the command manager may be further configured to generate the plurality of dedicated commands based on the control command.

[0017] The common command and the dedicated command may be changed through a cloud service.

[0018] The control command may include identification information of the destination device.

[0019] According to an aspect of the disclosure, network management method may include: receiving a control command to be transmitted to a destination device among a plurality of service providing devices included in a network; generating, based on the control command, a dedicated command for the destination device based on the control command being a common command for the plurality of service providing devices; and controlling the destination device by transmitting the dedicated command thereto.

[0020] The common command may include a control command for an operation that is performed by at least some of the plurality of service providing devices, where the dedicated command includes a control command that is not included in the common command.

[0021] The method may further include transmitting the control command to the destination device based on the control command being a dedicated command corresponding to the destination device.

[0022] The method may further include: transmitting cache information to a user terminal that transmits the control command.

[0023] The method may further include relaying communication between a user terminal that transmits the control command and the destination device.

[0024] The relaying the communication between the user terminal and the destination device may be based on whether the user terminal is authenticated.

[0025] The method may further include generating, based on the control command, a dedicated command for each of a plurality of destination devices.

[0026] The generating the dedicated command for the each of a plurality of destination devices may include

generating, based on the control command, a plurality of dedicated commands corresponding to the common command.

[0027] The common command and the dedicated command may be changed through a cloud service.

[0028] The control command may include identification information of the destination device.

[0029] According to an aspect of the disclosure, a network management system may include: a plurality of service providing devices included in a network; a network management device configured to manage the network; and a user terminal configured to transmit a control command to the plurality of service providing devices through the network management device, where the network management device includes one or more processors and a memory storing instructions that, when executed by the one or more processors, cause the network management device to: receive a control command to be transmitted to a destination device among the plurality of service providing devices, generate a dedicated command corresponding to the destination device among the plurality of service providing devices, and control the destination device by transmitting the dedicated command thereto.

[0030] The network management device may be further configured to: receive a control command to be transmitted to a plurality of destination devices among the plurality of service providing devices, generate a dedicated command for each of the plurality of destination devices, and control the plurality of destination devices by respectively transmitting the dedicated command to each of the plurality of destination devices.

[0031] The control command may include identification of the destination device, where the dedicated command is generated based on the identification information of the destination device.

BRIEF DESCRIPTION OF DRAWINGS

[0032] The above and other aspects and features of the present disclosure will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings, in which:

[0033] FIG. **1** is a diagram illustrating a network management system according to an embodiment;

[0034] FIG. **2** is a diagram illustrating a user terminal according to an embodiment;

[0035] FIG. **3** is a diagram for describing functions of a network management device according to an embodiment;

[0036] FIG. **4** is a block diagram of the network management device according to an embodiment;

[0037] FIG. **5** is a diagram for describing an operation of a command manager when a common command is received according to an embodiment;

[0038] FIG. **6** is a diagram for describing an operation of the command manager when a dedicated command is received according to an embodiment;

[0039] FIG. **7** is a diagram for describing an operation of the command manager when cache information exists according to an embodiment;

[0040] FIG. **8** is a diagram illustrating a common command table according to an embodiment;

[0041] FIG. **9** is a diagram illustrating a dedicated command table according to an embodiment; and

[0042] FIG. **10** is a diagram for describing an operation of a relay interface according to an embodiment.

DETAILED DESCRIPTION

[0043] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Advantages and features of the present disclosure, and a method for achieving the advantages and features will become apparent with reference to the exemplary embodiments described below in detail in conjunction with the accompanying drawings. However, the present disclosure is not limited to the exemplary embodiments below, but may be implemented in a variety of different forms, these exemplary embodiments will be provided only in order to make the present disclosure complete and allow those skilled in the art to completely recognize the scope of the present disclosure, and the present disclosure is only defined by the scope of the claims. The same reference numbers indicate the same components throughout the specification.

[0044] Unless defined otherwise, all terms (including technical and scientific terms) used in the present specification have the same meaning as meanings commonly understood by those skilled in the art to which the present disclosure pertains.

[0045] It will be understood that the terms "includes," "comprises," "has," "having," "including," and/or "comprising," when used in this specification, specify the presence of stated features, figures, steps, operations, components, members, or combinations thereof, but do not preclude the presence or addition of one or more other features, figures, steps, operations, components, members, or combinations thereof.

[0046] As used herein, each of the expressions "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 one or all possible combinations of the items listed together with a corresponding expression among the expressions.

[0047] It will be understood that the terms "first", "second", or the like, may be used to distinguish one component from another, and should not be construed to limit the corresponding component in other aspects (e.g., importance or order).

[0048] FIG. **1** is a diagram illustrating a network management system, and FIG. **2** is a diagram illustrating a user terminal.

[0049] Referring to FIG. **1**, a network management system **10** may include a service providing device **100**, a user terminal **200**, a network management device **300**, and a communication network **400**.

[0050] The service providing device **100** may provide a network service. In the present disclosure, the network service refers to a service that may be provided through a network. For example, the network service may include a video provision service. The service providing device **100** may include at least one of a camera, a network video recorder (NVR), a digital video recorder (DVR), and a management server. The service providing device **100** may provide video generated through capturing or may provide stored video. The management server may transmit the captured or stored video according to an external request. For example, the service providing device **100** may be a video providing system built in an on-premise manner. A plurality of service providing devices **100** operated by the same entity or different entities may provide individual video providing services. The video provided by the service

providing device **100** may be a moving image or still image, or both video images and still images.

[0051] The user terminal **200** may receive the network service provided by the service providing device **100**. For example, the user terminal **200** may receive the video from the service providing device **100**.

[0052] The network management system **10** may include a plurality of service providing devices **100**. The user terminal **200** may receive a service from a service providing device **100** selected from among the plurality of service providing devices **100**.

[0053] The network management device **300** may relay communication between the service providing device **100** and the user terminal **200**. The network management device **300** may relay an exchange of control commands between the service providing device **100** and the user terminal **200**.

[0054] The user terminal **200** may transmit a control command to receive a service. The network management device **300** may receive the control command from the user terminal **200**, identify the service providing device **100** corresponding to the control command, and control an operation by transmitting a service providing command to the corresponding service providing device **100**. The service providing command may be generated with reference to the control command and may represent a dedicated command to be described later. The service providing device **100** may be controlled to provide a service corresponding to the service providing command. For example, the service providing device **100** may be controlled to transmit the video to the user terminal **200**.

[0055] The communication network **400** may provide a communication path between the service providing device **100**, the user terminal **200**, and the network management device **300**. For example, the user terminal **200** may transmit the control command to the network management device **300** through the communication network **400**, and the network management device **300** may transmit the service providing command to the service providing device **100** through the communication network **400**. In addition, the service providing device **100** may provide a service to the user terminal **200** through the communication network **400**.

[0056] The network **400** may include a wired network such as local area networks (LANs), wide area networks (WANs), metropolitan area networks (MANs), and integrated service digital networks (ISDNs), etc., a wireless network including wireless Internet such as 3G, 4G (LTE), 5G, Wi-Fi, Wireless Internet such as Wibro, Wimax, etc. a wireless network including short-distance communication and short distance networks, such as Bluetooth, radio frequency identification (RFID), Infrared Data Association (IrDA), Ultra Wideband (UWB), ZigBee, Near field communication (NFC), etc.

[0057] FIG. **1** illustrates one communication network **400**, but the communication network **400** may include a plurality of partial communication networks that connect the service providing device **100**, the user terminal **200**, and the network management device **300** to each other.

[0058] As described above, the network management system **10** may include the plurality of service providing devices **100**. At least some of the plurality of service providing devices **100** may perform different functions. For example, the network management system **10** may include a plurality of service providing devices **100** manufactured by different manufacturers, or may include a plurality of service providing devices **100** that provide different functions by the same manufacturer. Different service providing devices **100** may operate by individually set commands.

[0059] Each of the service providing devices **100** and the user terminal **200** may include one or more processors. The one or more processors may include one or more of a central processing unit (CPU), a many integrated core (MIC), a field-programmable gate array (FPGA), a digital signal processor (DSP), a hardware accelerator, etc. The one or more processors may be able to perform control of any one or any combination of the other components or functions of the respective device, and/or perform an operation or data processing relating to communication. The one or more processors execute one or more programs stored in a memory.

[0060] Referring to FIG. **2**, the user terminal **200** may include a plurality of applications **210**, **220**, **230**, and **240**.

[0061] The plurality of applications **210** to **240** may be provided to control the operations of the plurality of service providing devices **100**. For example, the application A **210** may be provided to control an operation of a service providing device A, and the application B **220** may be provided to control an operation of a service providing device B.

[0062] A lot of time and cost may be consumed in producing and maintaining the plurality of applications **210** to **240**. The network management device **300** according to an exemplary embodiment of the present disclosure may integrate and manage at least some of the plurality of service providing devices **100**. That is, when a preset common command is received from the user terminal **200**, the network management device **300** may transmit a dedicated command corresponding to the common command to the service providing device **100** to control the service providing device **100**.

[0063] In the present disclosure, the common command may include a control command for the same operation that may be performed by at least some of the plurality of service providing devices **100**. Among the functions provided in at least some of the service providing devices **100** included in the network management system **10**, there may be the same functions regardless of whether the manufacturer or product is the same. For example, at least some of the service providing devices **100** may be switched to an active state to start the operation or switched to an inactive state to stop the operation.

[0064] The common command may include a request for a response regarding whether the service providing device **100** is active. At least some of the applications **210** to **240** included in the user terminal **200** may transmit the common command to request a response regarding whether the corresponding service providing device **100** is active. For example, the application A **210** may transmit a common command that includes a request for a response regarding whether the service providing device A is active together with identification information of the service providing device A. In this case, the network management device **300** may transmit a dedicated command for requesting a response regarding whether the service providing device A is active to the service providing device A and transmit the response to the user terminal **200**.

[0065] The common command may include a user registration command to control the service providing device **100**

or a user deregistration command to disable control of the service providing device **100**.

[0066] The common command may include a license attachment command or a license separation command for use of the service providing device **100**. The type or scope of the service provided by the service providing device **100** may be determined according to the license.

[0067] The common commands may include a basic information request command for the service providing device **100**. Basic information of the service providing device **100** may include a firmware version of equipment included in the service providing device **100**, a name of the equipment, and identification information of the equipment. In addition, the common command may include a command requesting a list of equipment included in the service providing device **100**, a rebooting command for the equipment, and a firmware upgrade command.

[0068] In the present disclosure, the dedicated command may include a control command that is not included in the common commands and represent a control command that may be interpreted by the service providing device **100**.

[0069] When a new service providing device **100** is included in the network management system **10** or the function of the service providing device **100** is added, the applications **210** to **240** provided in the user terminal **200** may need to be updated. Since the network management device **300** may generate the dedicated command based on the common command, the plurality of service providing devices **100** may be integrated and controlled even if the applications **210** to **240** provided in the user terminal **200** are not updated.

[0070] FIG. **3** is a diagram for describing functions of a network management device.

[0071] Referring to FIG. **3**, the network management device **300** may provide a cloud service.

[0072] A unified service for the plurality of service providing devices **100** may be possible through the cloud service. For example, the same user interface may be provided for the plurality of service providing devices **100** that provide similar functions. Intuitive services for different service providing devices **100** may be provided through the same user interface.

[0073] In addition, integrated management of the above-described common command and dedicated command may be performed through the cloud service. For example, the common command and the dedicated command may be added or updated (e.g., changed) through the cloud service. The user may use the integrated and managed common command and dedicated command by modifying the application provided in the user terminal **200** or creating a new application.

[0074] There may be a plurality of cloud services provided by the network management device **300**. The user may select one of the plurality of cloud services, and the network management device **300** may provide the cloud service selected by the user. For example, when a cloud service that provides video provision service by a specific service providing device **100** is selected, the network management device **300** may provide a user interface that includes a list of cameras included in the service providing device **100** or a list of video captured by each camera. Alternatively, when a cloud service that provides an artificial intelligence analysis service for captured video is selected, the network management device **300** may provide a user interface that includes video reflecting the results of artificial intelligence analysis.

[0075] FIG. **4** is a block diagram of the network management device according to an exemplary embodiment of the present disclosure.

[0076] Referring to FIG. **4**, the network management device **300** according to an exemplary embodiment of the present disclosure includes an input **310**, a storage **320**, a controller **330**, a command manager **340**, a relay **350**, a first communication interface **361**, and a second communication interface **362**.

[0077] At least some of the components, elements, modules or units represented by a block as illustrated in FIG. **4** may be embodied as various numbers of hardware, software and/or firmware structures that execute respective functions described herein. A network management device **300** according to embodiments of the present disclosure may include one or more processors. The one or more processors may include one or more of a central processing unit (CPU), a many integrated core (MIC), a field-programmable gate array (FPGA), a digital signal processor (DSP), a hardware accelerator, etc. The one or more processors may be able to perform control of any one or any combination of the other components or functions of the network management device represented by FIG. **4**, and/or perform an operation or data processing relating to communication. The one or more processors execute one or more programs stored in a memory. The memory may include volatile memory such as a static random access memory (S-RAM) and a dynamic random access memory (D-RAM) for temporarily storing data. In addition, the memory may include a non-volatile memory such as a read only memory (ROM), an erasable programmable read only memory (EPROM), and an electrically erasable programmable read only memory (EEPROM) for long-term storage of data.

[0078] The input **310** may receive various data for operation of the network management device **300**. For example, the input **310** may receive a common command table **500** (see FIG. **8**) and a dedicated command table **600** (see FIG. **9**), which will be described later. When the common command table **500** or the dedicated command table **600** is updated, the input **310** may receive the updated common command table **500** or the updated dedicated command table **600**.

[0079] The storage **320** may temporarily or permanently store various data input through the input **310**. For example, the storage **320** may store the common command table **500** and the dedicated command table **600**. In addition, the storage **320** may store various cache information about the service providing device **100**. For example, the storage **320** may store information such as an active state, a shooting angle, and a storage capacity of the service providing device **100**. In addition, the storage **320** may temporarily or permanently store various information necessary for the operation of the network management device **300**.

[0080] The command manager **340** may process the control command received through the first communication interface **361**. When the control command is received, the command manager **340** may first determine whether the control command is a common command for at least some of the plurality of service providing devices **100** included in the network management system **10**. Thus, if the control command is a common command, the command manager

340 may generate, based on the control command, a dedicated command for a destination device. Here, the destination device represents the service providing device 100 selected as a destination of the control command among the plurality of service providing devices 100 included in the network management system 10. The user terminal 200 may transmit identification information of the destination device by including the identification information in the control command. The command manager 340 may determine the destination device by referring to the identification information included in the control command, and may, based on the common command, perform control operations by transmitting a dedicated command that may be recognized by the corresponding destination device.

[0081] The command manger 340 may determine whether the control command is a common command by referring to the common command table 500 stored in the storage 320, and may generate the dedicated command based on the common command. The common command table 500 will be described in detail later with reference to FIG. 8.

[0082] When the received control command is a dedicated command, the command manager 340 may not perform generation of the dedicated command based on the control command. The command manager 340 may determine whether the control command is a dedicated command by referring to the dedicated command table 600 stored in the storage 320. The dedicated command table 600 will be described in detail later with reference to FIG. 9.

[0083] The relay interface 350 may relay communication between the user terminal 200 that transmitted the control command and the destination device. For example, the relay interface 350 may perform tunneling between the user terminal 200 and the destination device. The user terminal 200 and the destination device may exchange requests and responses through the relay interface 350.

[0084] The relay interface 350 may relay communication between the user terminal 200 and the destination device by referring to whether the user terminal 200 has been authenticated. That is, the relay interface 350 ensures that the tunneling with the destination device is performed only for the authenticated user terminal 200. If authentication of the user terminal 200 fails, the relay interface 350 may block communication between the user terminal 200 and the destination device.

[0085] The first communication interface 361 may communicate with the user terminal 200. The first communication interface 361 may receive a control command requested to be transmitted to the destination device among the plurality of service providing devices 100 included in the network from the user terminal 200. In addition, when relaying is performed between the user terminal 200 and the destination device by the relay interface 350, the first communication interface 361 may receive a request from the user terminal 200 and transmit a response received from the destination device to the user terminal 200 in response to the request.

[0086] The second communication interface 362 may communicate with the service providing device 100. The second communication interface 362 may transmit a dedicated command to the destination device. When the control command received through the first communication interface 361 is a dedicated command for the destination device, the second communication interface 362 may transmit the control command to the destination device. In addition, when relaying is performed between the user terminal 200 and the destination device by the relay interface 350, the second communication interface 362 may transmit the request received from the user terminal 200 to the destination device and receive a response corresponding to the request from the destination device.

[0087] The first communication interface 361 and the second communication interface 362 may each communicate with the user terminal 200 and the service providing device 100 through individual communication channels.

[0088] The controller 330 may perform overall control over the input 310, the storage 320, the command manager 340, the relay interface 350, the first communication interface 361, and the second communication interface 362.

[0089] FIG. 5 is a diagram for describing an operation of a command manager when a common command is received, FIG. 6 is a diagram for describing an operation of the command manager when a dedicated command is received, and FIG. 7 is a diagram for describing an operation of the command manager when cache information exists.

[0090] Referring to FIG. 5, when a common command is received as a control command, the command manager 340 may generate a dedicated command based on the common command.

[0091] The common command, which is a command set between the user terminal 200 and the network management device 300, may not be recognized by the service providing device 100. Accordingly, the command manager 340 may generate, based on the common command, a dedicated command that may be recognized by the service providing device 100.

[0092] Referring to FIG. 6, when a dedicated command is received as a control command, the command manager 340 may not perform generation of a dedicated command from the control command.

[0093] When the user terminal 200 includes a dedicated command that may be recognized by the service providing device 100, the user terminal 200 may transmit the dedicated command as the control command. In this case, the command manager 340 may transmit the corresponding dedicated command to the service providing device 100 through the second communication interface 362 without performing the generation of the dedicated command from the control command.

[0094] Referring to FIG. 7, when cache information for the control command exists, the command manager 340 may transmit the cache information to the user terminal 200 that transmitted the control command.

[0095] The command manager 340 may determine whether the control command may be responded to by transmitting cache information. Therefore, when the response to the control command is stored in the storage 320 as the cache information, the command manager 340 may extract the corresponding cache information from the storage 320, and transmit the cache information to the user terminal 200 through the first communication interface 361.

[0096] Since a response to a request from the user terminal 200 is performed without communication with the service providing device 100, faster service processing is possible and unnecessary waste of network resources may be prevented.

[0097] FIG. 8 is a diagram illustrating a common command table.

[0098] Referring to FIG. **8**, the common command table **500** includes a common command field **510**, an identification information field **520**, and a dedicated command field **530**.

[0099] FIG. **8** illustrates a common command table **500** when the network management system **10** includes a service providing device A, a service providing device B, a service providing device C, and a service providing device D.

[0100] A common command may be specified in the common command field **510**, identification information of the service providing device **100** may be specified in the identification information field **520**, and a dedicated command may be specified in the dedicated command field **530**.

[0101] Identification information of the service providing device **100** to which the common command is applicable may be specified for each common command, and a dedicated command corresponding to the common command may be specified for each identification information of the service providing device **100**. Referring to FIG. **8**, a dedicated command of the service providing device A for a common command 1 may be 1A, a dedicated command of the service providing device C may be 1C, a dedicated instruction of the service providing device D is 1D, and a dedicated command of the service providing device B may not be set.

[0102] When a control command is received through the first communication interface **361**, the command manager **340** may determine whether the control command is the common command by referring to the common command table **500**. That is, the command manager **340** may check whether the common command corresponding to the received control command is included in the common command table **500**. Thus, when the received control command is included in the common command table **500**, the command manager **340** may determine that the control command is the common command. In addition, the command manager **340** may check identification information of the service providing device **100** included in the control command and generate a dedicated command corresponding to the identification information from the common command table **500**.

[0103] The dedicated command generated by the command manager **340** may be transmitted to the service providing device **100** through the second communication interface **362**.

[0104] When there are a plurality of destination devices, the command manager **340** may generate the dedicated command, based on the control command, for each of the plurality of destination devices. The user terminal **200** may transmit a plurality of control commands to check activation states of the plurality of destination devices. Alternatively, the user terminal **200** may transmit one control command by including a plurality of common commands. The command manager **340** may generate all dedicated commands corresponding to the corresponding control command by referring to the common command table **500**. For example, when the common command 1 for the service providing device A and the service providing device D is received, the command manager **340** may generate a dedicated command 1A and a dedicated command 1D from the common command table **500**. Since the network management device **300** performs integrated processing of the plurality of common commands, the user terminal **200** may easily receive responses to the plurality of common commands.

[0105] In the present disclosure, the common command represents a control command set between the user terminal **200** and the network management device **300**. The common command table **500** may be continuously updated by an administrator of the network management device **300**, and the user terminal **200** may control a new service providing device **100** without separately updating the applications **210** to **240**.

[0106] FIG. **8** illustrates that one dedicated command is specified for one identification information, but according to some exemplary embodiments of the present disclosure, a plurality of dedicated commands may also be specified for one identification information. That is, the plurality of dedicated commands may correspond to one common command. When there are a plurality of dedicated commands corresponding to the common command, the command manager **340** may generate a plurality of dedicated commands based on the control command received through the first communication interface **361**. For example, the command manager **340** may generate the plurality of dedicated commands by referring to the common command table **500**. The plurality of dedicated commands generated by the command manager **340** may be transmitted to the service providing device **100** through the second communication interface **362**.

[0107] FIG. **9** is a diagram illustrating a dedicated command table.

[0108] Referring to FIG. **9**, the dedicated command table **600** includes an identification information field **610** and a dedicated command field **620**.

[0109] Identification information of the service providing device **100** may be specified in the identification information field **610**, and a dedicated command may be specified in the dedicated command field **620**.

[0110] At least one dedicated command may be specified for each identification information of the service providing device **100**. Referring to FIG. **9**, a dedicated command Aa, a dedicated command Ab, and a dedicated command Ac may be specified for service providing device A.

[0111] When the control command received through the first communication interface **361** is not the common command, the command manager **340** may determine whether the corresponding control command is the dedicated command by referring to the dedicated command table **600**. That is, the command manager **340** may check whether the dedicated command corresponding to the received control command is included in the dedicated command table **600**. Thus, when the received control command is included in the dedicated command table **600**, the command manager **340** may determine that the control command is the dedicated command. In addition, the command management manager **340** may check identification information of the service providing device **100** included in the control command and generate a dedicated command corresponding to the identification information from the dedicated command table **600**.

[0112] The dedicated command generated by the command manager **340** may be transmitted to the service providing device **100** through the second communication interface **362**.

[0113] FIG. **10** is a diagram for describing an operation of a relay interface.

[0114] Referring to FIG. **10**, the relay interface **350** may relay communication between the service providing device **100** and the user terminal **200**.

[0115] The relay interface **350** may receive a request from the user terminal **200** and transmit the received request to the service providing device **100**. In addition, when the service providing device **100** transmits a response to the request, the relay interface **350** may transmit the response to the user terminal **200**.

[0116] The relay interface **350** may perform a relay operation upon request from the user terminal **200**. For example, the user terminal **200** may transmit a control command requesting relaying with the service providing device **100**. The user terminal **200** may not secure an address of the service providing device **100**. In this case, the user terminal **200** may request relaying with the service providing device **100** to the relay interface **350**. Accordingly, the user terminal **200** that has not secured the address of the service providing device **100** may also receive the service of the service providing device **100** through the relay interface **350**.

[0117] The above-described embodiments are merely specific examples to describe technical content according to the embodiments of the disclosure and help the understanding of the embodiments of the disclosure, not intended to limit the scope of the embodiments of the disclosure. Accordingly, the scope of various embodiments of the disclosure should be interpreted as encompassing all modifications or variations derived based on the technical spirit of various embodiments of the disclosure in addition to the embodiments disclosed herein.

1. A network management device comprising:

a first communication interface configured to receive a control command to be transmitted to a destination device among a plurality of service providing devices included in a network;

a command manager configured to generate, based on the control command, a dedicated command for the destination device based on the control command being a common command to be transmitted to at least some of the plurality of service providing devices; and

a second communication interface configured to transmit the dedicated command to the destination device.

2. The network management device of claim **1**, wherein the common command comprises a control command for an operation that is performed by the at least some of the plurality of service providing devices, and

wherein the dedicated command comprises a control command that is not included in the common command.

3. (canceled)

4. The network management device of claim **1**, wherein the command manager is further configured to transmit cache information to a user terminal that transmits the control command.

5. The network management device of claim **1**, further comprising a relay interface configured to relay communication between a user terminal that transmits the control command and the destination device.

6. The network management device of claim **5**, wherein the relay interface is further configured to relay the communication between the user terminal and the destination device based on whether the user terminal is authenticated.

7. The network management device of claim **1**, wherein the command manager is further configured to, based on the control command, generate a dedicated command for each of a plurality of destination devices.

8. The network management device of claim **1**, wherein, based on a plurality of dedicated commands corresponding to the common command, the command manager is further configured to generate the plurality of dedicated commands based on the control command.

9. (canceled)

10. The network management device of claim **1**, wherein the control command comprises identification information of the destination device.

11. A network management method comprising:

receiving a control command to be transmitted to a destination device among a plurality of service providing devices included in a network;

generating, based on the control command, a dedicated command for the destination device based on the control command being a common command for the plurality of service providing devices; and

controlling the destination device by transmitting the dedicated command thereto.

12. The network management method of claim **11**, wherein the common command comprises a control command for an operation that is performed by at least some of the plurality of service providing devices, and

wherein the dedicated command comprises a control command that is not included in the common command.

13. (canceled)

14. The network management method of claim **11**, further comprising transmitting cache information to a user terminal that transmits the control command.

15. The network management method of claim **11**, further comprising relaying communication between a user terminal that transmits the control command and the destination device.

16. The network management method of claim **15**, wherein the relaying the communication between the user terminal and the destination device is based on whether the user terminal is authenticated.

17. The network management method of claim **11**, further comprising generating, based on the control command, a dedicated command for each of a plurality of destination devices.

18. The network management method of claim **11**, wherein the generating the dedicated command for the each of a plurality of destination devices comprises generating, based on the control command, a plurality of dedicated commands corresponding to the common command.

19. (canceled)

20. The network management method of claim **11**, wherein the control command comprises identification information of the destination device.

21. A network management system comprising:

a plurality of service providing devices included in a network;

a network management device configured to manage the network; and

a user terminal configured to transmit a control command to the plurality of service providing devices through the network management device,

wherein the network management device comprises one or more processors and a memory storing instructions that, when executed by the one or more processors, cause the network management device to:

receive a control command to be transmitted to a destination device among the plurality of service providing devices,

generate a dedicated command corresponding to the destination device among the plurality of service providing devices, and

control the destination device by transmitting the dedicated command thereto.

22. The network management system of claim **21**, wherein the network management device is further configured to:

receive a control command to be transmitted to a plurality of destination devices among the plurality of service providing devices,

generate a dedicated command for each of the plurality of destination devices, and

control the plurality of destination devices by respectively transmitting the dedicated command to each of the plurality of destination devices.

23. The network management system of claim **21**, wherein the control command comprises identification of the destination device, and

wherein the dedicated command is generated based on the identification information of the destination device.

24. The network management system of claim **21**, wherein the control command comprises a command for an operation that is to be performed by the destination device.

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