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Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

[Continued on next page]

- (54) Title: CONFIGURING MANAGED DEVICES

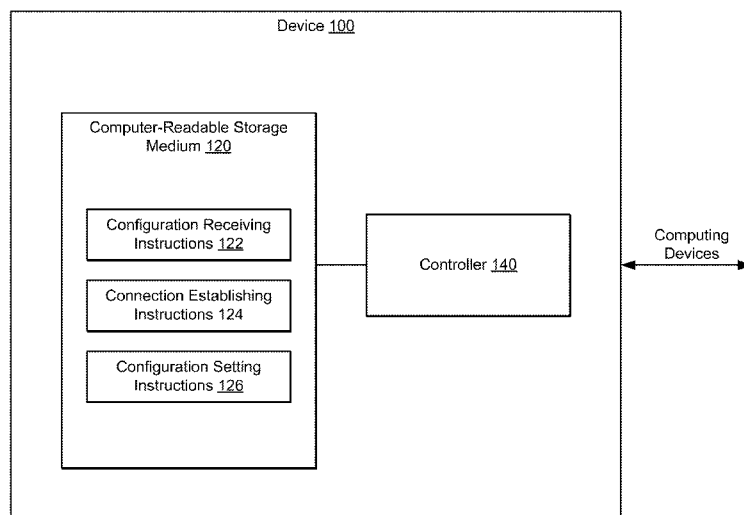


FIG. 1

(57) Abstract: Example implementations relate to configuring managed devices. For example, a device includes a controller to receive a network configuration from a management device, and temporarily apply the network configuration and attempt a network connection with the management device using the network configuration. The controller is to configure the device with the network configuration if the network connection is established using the network configuration, and revert to a previous network configuration if the network connection is not established using the network configuration.



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CONFIGURING MANAGED DEVICES

BACKGROUND

[0001] Network management such as cloud network management often involves administrators that configure devices (e.g., switches, access points, etc.) located remotely from the management device or administrator (i.e., off-premise). Such administrators may need to verify that configuration changes have the desired effect on the devices or that the configuration changes have not introduced an undesired effect.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] Some examples of the present application are described with respect to the following figures:

[0003] FIG. 1 is a block diagram of an example device configurable by a management device;

[0004] FIG. 2 is a block diagram of an example device configurable by a management device;

[0005] FIG. 3 is a flowchart of an example method for configuring managed devices; and

[0006] FIG. 4 is a flowchart of an example method for configuring managed devices.

DETAILED DESCRIPTION

[0007] As described above, in a network based management environment, such as a cloud based network management environment, configuration of end devices (e.g., network devices such as switches and access points) are pushed by the management device to the end devices. While pushing the configurations, an end device may lose

network connectivity to the management device due to the configurations pushed by the management device. When the network connectivity between the management device and the end device is lost, the management device may be unable to manage the end device due to loss of communication, and may require physical intervention at the end device to re-establish connectivity.

[0008] Examples disclosed herein address the above needs and challenges by providing a solution for a device to temporarily apply a network configuration received from a management device to determine whether the network configuration affect connectivity of the device to the management device. If connectivity to the management device is unaffected, the network configuration is permanently applied. However, if the connectivity to the management device is affected (e.g., no connectivity after a threshold time), the device reverts to a previous network configuration that establishes network connection with the management device, and informs the management device that the received network configuration is not applied at the device. Accordingly, downtime of the device resulting from configuration changes can be significantly reduced, and physical handling of devices (to reset connection) can also be significantly reduced. Moreover, the described examples enable an improved solution for distributed deployment of end devices.

[0009] In one example, a device includes a controller to receive a network configuration from a management device, and temporarily apply the network configuration and attempt a network connection with the management device using the network configuration. The controller is to configure the device with the network configuration if the network connection is established using the network configuration, and revert to a previous network configuration if the network connection is not established using the network configuration.

[0010] In another example, a method for configuring a device includes receiving, at the device, a network configuration from a management device, and determining if a network connection can be established with the management device using the network configuration. The method also includes applying the network configuration upon determining that the network connection is established with the management device using the network configuration, and restoring a previous network configuration upon determining that the network connection is not established with the management device using the network configuration.

[0011] In another example, a non-transitory computer-readable storage medium is encoded with instructions executable by a processor of a device to receive a configuration packet from a management device and determine whether the configuration packet includes a network connectivity configuration. If the configuration packet includes a network connectivity configuration, the instructions are executable to temporarily apply the network connectivity configuration to determine whether a network connection can be maintained with the management device using the network connectivity configuration. The instructions are executable to configure the device with the network connectivity configuration if the network connection can be maintained, and revert the device to a previous network connectivity configuration if the network connection cannot be maintained.

[0012] Referring now to the figures, FIG. 1 is a block diagram of an example device configurable by a management device. Device 100 may be any computing device such as that can connect to the Internet via one or more networks. In some examples, device 100 can be a switch, a router, a hub, a repeater, a bridge, an access point (AP), or any other electronic device. Further, device 100 can be a network device managed by a network manager/application or an Internet of Things (IoT) device managed by a management device/application. In other examples, device 100 can be a cloud-managed device managed by a cloud network manager. Device 100 can communicate with other computing devices including a management device. Device 100 includes a controller 140 and a computer-readable storage medium 120.

[0013] Controller 140 can be one or more central processing units (CPUs), microprocessors, and/or other hardware devices suitable for retrieval and execution of instructions stored in computer-readable storage medium 120. Controller 140 may fetch, decode, and execute instructions 122, 124, and 126 to enable the configuring of device 100, as described below. As an alternative or in addition to retrieving and executing instructions, controller 140 may include one or more electronic circuits comprising a number of electronic components for performing the functionality of one or more of instructions 122, 124, and 126.

[0014] Computer-readable storage medium 120 may be any electronic, magnetic, optical, or other physical storage device that stores executable instructions. Thus, computer-readable storage medium 120 may be, for example, random access memory (RAM), content addressable memory (CAM), ternary content addressable memory

(TCAM), an electrically-erasable programmable read-only memory (EEPROM), flash memory, a storage drive, an optical disc, and the like. As described in detail below, computer-readable storage medium 120 may be encoded with executable instructions for enabling the configuration of managed device 100.

[0015] Configuration receiving instructions 122 include instructions to receive a network configuration from a management device such as a cloud network manager. In various examples, the network configuration is a configuration that relates to network connectivity of the device 100 to the management device. The network configuration can be identified from a plurality of configurations received at the device 100, for example, by comparing the configurations to pre-defined network configurations (e.g., a list of network connectivity configurations) stored at the device 100. Examples of network configurations include, but are not limited to, internet protocol (IP) address, a default gateway, a domain name system (DNS), a web proxy, or a firewall. In some examples, non-network configurations (i.e., configurations that do not relate to network connectivity) received from the management device can be permanently applied at the device 100

[0016] Connection establishing instructions 124 include instructions to temporarily apply the network configuration and attempt a network connection with the management device using the network configuration. For example, the device 100 is temporarily configured with the network configuration to determine whether a network connection can be maintained (or established) with the management device. In various examples, a timer is enabled to determine whether the network connection can be established within a threshold time period, using the network configuration.

[0017] Configuration setting instructions 126 include instructions to configure the device with the configurations if the network connection is established using the network configuration, and to revert to a previous network configuration if the network connection is not established using the network configuration. For example, if within the threshold time period, a network connection can be established with the management device using the network configuration, the network configuration can be permanently applied at the device 100. However, if the network connection cannot be established using the network configuration, prior to expiration of the threshold time period, the previous network configuration is applied at the device. The previous network configuration is a network configuration that establishes a network

connection with the management device (e.g., a network configuration the device 100 was operating in prior to receiving the network configuration from the management device, or an old working network configuration).

[0018] In various examples, once the network connection is established using the previous network connection, device 100 informs the management device a network connection could not be established using the received network configuration, and that the device 100 is configured with a previous network configuration. By informing the management device, the management device can take appropriate actions such as informing an administrator (e.g., a user) and taking corrective actions.

[0019] FIG. 2 is a block diagram of an example device configurable by a management device. Device 200 includes a controller 240, a timer 260, an interface 270, and a storage including network configurations 250. The components of device 200 may be similar to the corresponding components of device 100 described above with respect to FIG. 1.

[0020] Interface 270 can include a number of electronic components for communicating with other devices. For example, interface 270 may be a wireless interface such as wireless local area network (WLAN) interface and/or a physical interface such as an Ethernet interface, universal serial bus (USB) interface, extended serial advanced technology attachment (eSATA) interface, or any other physical connection interface suitable for communicating with other devices. In operation, as detailed below, interface 270 may be used to send and receive data to and from other computing devices.

[0021] Timer 260 is a timing device or internal clock of device 200 to determine an elapsed time. Controller 240 can initiate or trigger the timer 260 to count down to a predetermined threshold time for which an event is to occur. Accordingly, timer 260 can track a length of time. Storage 250 represents generally any device or combination of devices to store data for use by the device 200. Such data may include a list of network configurations (e.g., IP address, default gateway, DNS, web proxy, firewall, etc.).

[0022] Device 200 can be communicatively coupled to a management device 280. Management device 280 can be any computing device for managing the device 200. For example, management device 280 can be an off-premise (i.e., remotely located

from device 200). In some examples, management device 280 is a network manager such as a cloud-network manager for managing a plurality of network devices, including device 200. In other examples, management device 280 can be a server device for managing a plurality of client devices (e.g., device 200).

[0023] Management device 280 may push configuration settings to device 200 over a network (e.g. Internet). In some instances, the pushed configurations may include network configurations that, when implemented, may affect the connectivity of the device 200 to the management device 200. To eliminate or significantly reduce the downtime of device 200 due to failed network connection resulting from implementing a new network configuration, device 200 can temporarily apply the new network configuration (e.g., for a time period) to determine whether the new network configuration will affect the connection between the device 200 and the management device 280.

[0024] During operation, device 200 may receive a configuration packet from the management device via the interface 270. Device 200 can compare the configuration packet to a list of network configurations stored in storage device 250 to determine whether the configuration packet includes a network configuration. If it is determined that the configuration packet is not a network configuration, controller 240 applies (e.g., permanently) the non-network configuration at the device 200.

[0025] If it is determined that the configuration packet includes a network configuration, controller 240 temporarily applies the network configuration and attempts to establish a network connection with the management device 280 using the network configuration. Substantially simultaneously, controller 240 sets the timer 260 to count down to a predetermined time period. If the network connection is established prior to expiration of the time period, controller 240 permanently applies the network configuration at the device 200. If the network connection is not established prior to expiration of the time period, controller 240 reverts to a previous network configuration. The previous network configuration can be an old network configuration that establishes a network connection with the management device 280. Once the network connection is established with the management device 280, controller 240 sends a notification packet to the management device 280 informing the management device 280 that the received network configuration is not accepted

by the device 200 and that a previous network configuration has been applied at the device 200.

[0026] FIG. 3 is a flowchart of an example method for configuring managed devices. Although execution of method 300 is described below with reference to device 100 of FIG. 1, other suitable devices for execution of method 300 may be used such as device 200 of FIG. 2. Method 300 can be implemented in the form of executable instructions stored on a computer-readable storage medium, such as computer readable storage medium 120 of FIG. 1, and/or in the form of electronic circuitry.

[0027] Method 300 includes receiving, at a device, a network configuration from a management device, at 310. For example, device 100 can receive a network configuration from management device 280. The network configuration can be pushed to the device 100 from the management device 280.

[0028] Method 300 includes determining if a network connection can be established with the management device using the network configuration, at 320. For example, device 100 can attempt to connect to the management device 280 using the network configuration. In certain examples, the device 100 can attempt the network connection for a duration of time and/or for a predetermined number of attempts.

[0029] If the network connection can be established, at 320, using the network configuration, method 300 includes applying the network configuration, at 330. For example, if the device 100 is able to establish the network connection with the management device 280 prior to expiration of the duration of time or within the predetermined number of attempts, the network configuration is permanently applied at the device 100.

[0030] If the network connection cannot be established, at 320, using the network configuration, method 300 includes restoring a previous network configuration, at 340. For example, if the device 100 is unable to establish the network connection with the management device 280 prior to expiration of the duration of time or within the predetermined number of attempts, the device 100 reverts to a previous network configuration that establishes a network connection with the management device 280. In some examples, the method 300 of FIG. 3 includes additional steps in addition to and/or in lieu of those depicted in FIG. 3.

[0031] FIG. 4 is a flowchart of an example method for configuring managed devices. Although execution of method 400 is described below with reference to device 100 of FIG. 1, other suitable devices for execution of method 400 may be used such as device 200 of FIG. 2. Method 400 can be implemented in the form of executable instructions stored on a computer-readable storage medium, such as computer readable storage medium 120 of FIG. 1, and/or in the form of electronic circuitry.

[0032] Method 400 includes receiving a plurality of configurations from a management device, at 410. For example, device 100 can receive one or more configurations from a management device 280.

[0033] Method 400 includes identifying a network configuration from the plurality of configurations based on a comparison of the plurality of configurations to pre-defined network configurations, where the predefined network configurations include configurations that relate to network connectivity, at 420. For example, the network configuration can be identified based on a comparison of the plurality of network configurations to a list of network configurations (i.e., network connectivity related configurations) stored at the device 100.

[0034] Method 400 includes temporarily applying the network configuration and setting a timer to a predetermined time period and attempting a network connection with the management device, at 430. For example, the network configuration can be temporarily applied to determine whether a network connection can be established with the management device 280 using the network configuration, and prior to expiration of a predetermined time period tracked by a timer of the device 100.

[0035] Method 400 includes permanently applying the network configuration if the network connection is established prior to expiration of the time period, at 440, and restoring a previous network configuration if the network connection is not established prior to expiration of the time period, at 450. For example, if the network connection is established using the network configuration, prior to expiration of the time period, the network configuration is permanently applied at the device 100. However, if the network connection is not established using the network configuration, prior to expiration of the time period, the network configuration is not

applied at the device 100. Instead, the device 100 restores a previous network configuration that establishes a network connection with the management device 280.

[0036] Method 400 also includes informing the management device that the network connection is not supported by the network configuration and that the previous network configuration has been restored at the device, at 460. For example, once the previous network configuration has been restored and the network connection is established with the management device 280, device 100 can inform the management device 280 that the received network configuration did not support network connectivity and that the previous network configuration has been applied at the device 100. In some examples, the method 400 of FIG. 4 includes additional steps in addition to and/or in lieu of those depicted in FIG. 4.

[0037] The techniques described above may be embodied in a computer-readable medium for configuring a computing system to execute the method. The computer-readable media may include, for example and without limitation, any number of the following non-transitive mediums: magnetic storage media including disk and tape storage media; optical storage media such as compact disk media (e.g., CD-ROM, CD-R, etc.) and digital video disk storage media; holographic memory; nonvolatile memory storage media including semiconductor-based memory units such as FLASH memory, EEPROM, EPROM, ROM; ferromagnetic digital memories; volatile storage media including registers, buffers or caches, main memory, RAM, etc.; and the Internet, just to name a few. Other new and obvious types of computer-readable media may be used to store the software modules discussed herein. Computing systems may be found in many forms including but not limited to mainframes, minicomputers, servers, workstations, personal computers, notepads, personal digital assistants, tablets, smartphones, various wireless devices and embedded systems, just to name a few.

[0038] In the foregoing description, numerous details are set forth to provide an understanding of the present disclosure. However, it will be understood by those skilled in the art that the present disclosure may be practiced without these details. While the present disclosure has been disclosed with respect to a limited number of examples, those skilled in the art will appreciate numerous modifications and variations therefrom. It is intended that the appended claims cover such modifications and variations as fall within the true spirit and scope of the present disclosure.

CLAIMS

What is claimed is:

1. A device, comprising:
a controller to:
 receive a network configuration from a management device;
 temporarily apply the network configuration and attempt a network connection with the management device using the network configuration;
 configure the device with the network configuration if the network connection is established using the network configuration; and
 revert to a previous network configuration if the network connection is not established using the network configuration.
2. The device of claim 1, wherein the controller is to notify the management device that the network connection could not be established using the network configuration.
3. The device of claim 1, wherein the controller is to:
 initiate a timer when the network configuration is temporarily applied;
 configure the device with the network configuration if the network connection is established prior to an expiration of a threshold time; and
 revert to the previous network configuration if the network connection is not established prior to the expiration of the threshold time.
4. The device of claim 1, wherein the controller is to:
 receive a plurality of configurations from the management device; and
 identify the network configuration from the plurality of configurations based on a comparison of the plurality of configurations to a list of network configurations stored at the device.

5. The device of claim 4, wherein the controller is to configure the device with non-network configurations and temporarily apply network configurations to determine if the network connection can be established.

6. The device of claim 5, wherein the network configurations include configuration settings that affect connectivity of the device to the management device and wherein the network configurations include at least one of an Internet Protocol (IP) address, a default gateway, a domain name system (DNS), a web proxy, or a firewall.

7. The device of claim 1, wherein the device includes an interface to send and receive communications from the management device and wherein the controller is operatively coupled to the interface.

8. A method for configuring a device, comprising:
receiving, at the device, a network configuration from a management device;
determining if a network connection can be established with the management device using the network configuration;
applying the network configuration upon determining that the network connection is established with the management device using the network configuration; and
restoring a previous network configuration upon determining that the network connection is not established with the management device using the network configuration.

9. The method of claim 8, comprising informing the management device that the network connection is not supported by the network configuration and that the previous network configuration has been restored at the device.

10. The method of claim 8, wherein determining if the network connection can be established comprises:

temporarily applying the network configuration and setting a timer to a predetermined time period;
permanently applying the network configuration if the network connection is established prior to expiration of the time period; and
restoring the previous network configuration if the network connection is not established prior to expiration of the time period.

11. The method of claim 8, comprising:

receiving a plurality of configurations from the management device;
identifying the network configuration from the plurality of configurations based on a comparison of the configurations to predefined network configurations stored at the device, wherein the pre-defined network configurations include configurations that relate to network connectivity.

12. A non-transitory computer-readable storage medium encoded with instructions executable by a processor of a device, the computer-readable storage medium comprising instructions to:

receive a configuration packet from a management device;
determine whether the configuration packet includes a network connectivity configuration; and
if the configuration packet includes a network connectivity configuration, the instructions are executable to:
temporarily apply the network connectivity configuration to determine whether a network connection can be maintained with the management device using the network connectivity configuration;
configure the device with the network connectivity configuration if the network connection can be maintained; and
revert the device to a previous network connectivity configuration if the network connection cannot be maintained.

13. The non-transitory computer-readable storage medium of claim 12, wherein the previous network connectivity configuration is a configuration of the device prior to receipt of the configuration packet from the management device and wherein the previous network connectivity configuration maintains the network connection with the management device.

14. The non-transitory computer-readable storage medium of claim 12, comprising instructions to, if the configuration packet is not a network connectivity configuration, configure the device with the configuration included in the configuration packet.

15. The non-transitory computer-readable storage medium of claim 14, comprising instructions to determine whether the configuration packet includes a network connectivity configuration based on a comparison of the configuration packet to pre-defined network configurations stored at the device.

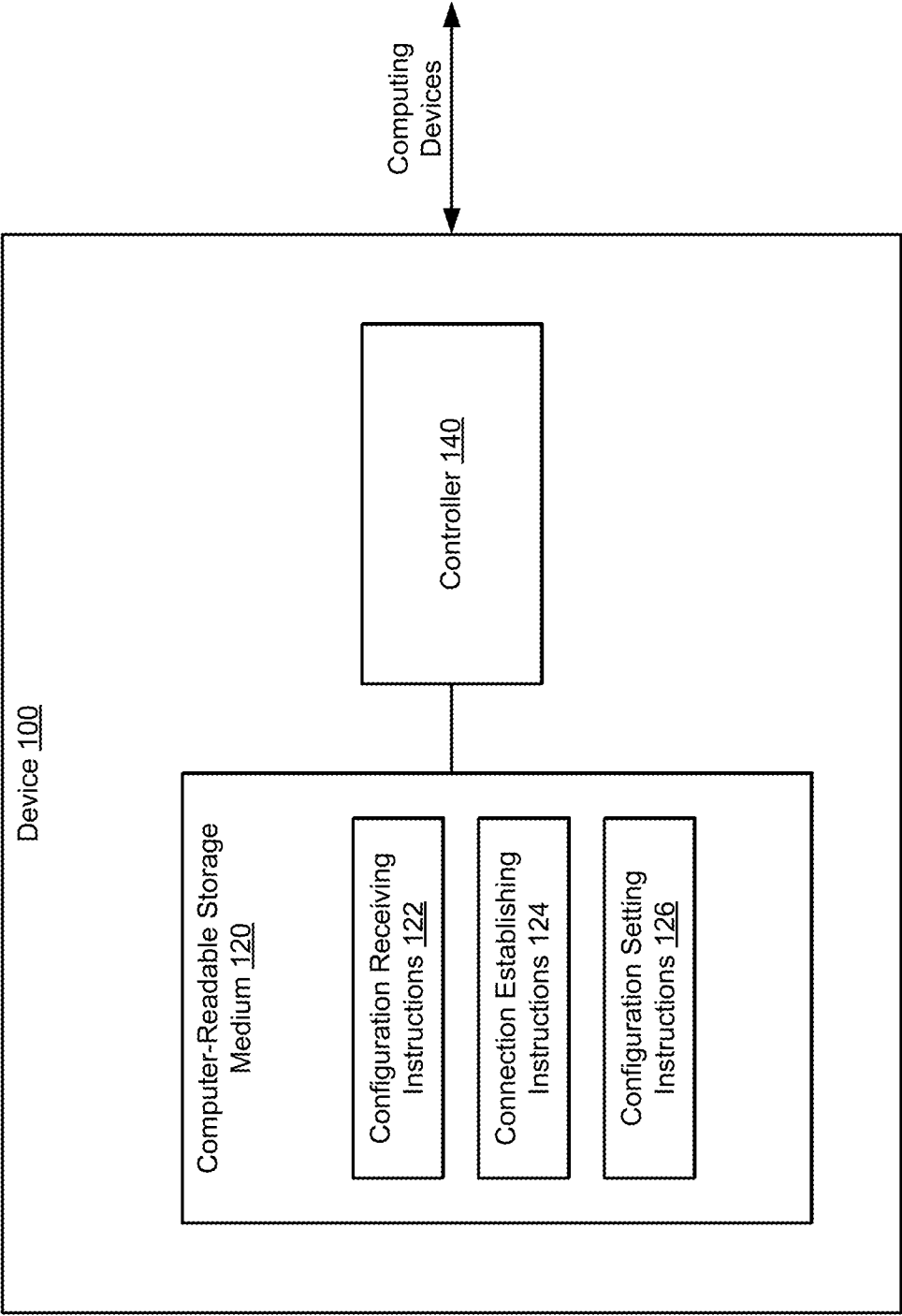


FIG. 1

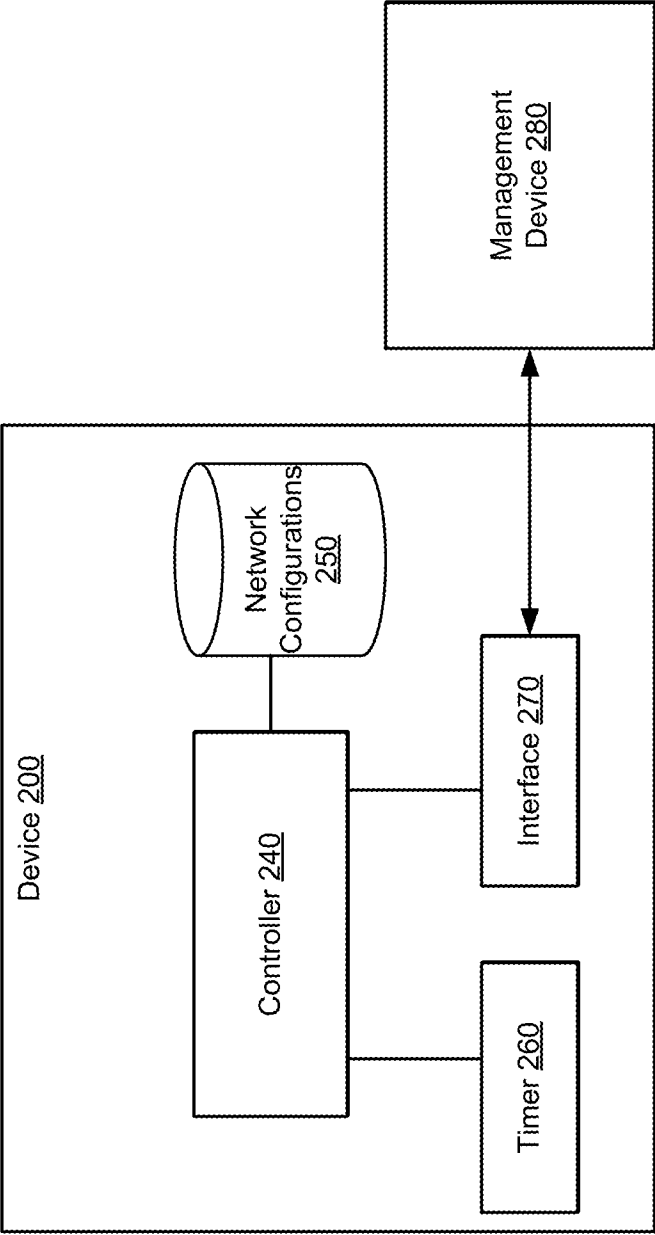


FIG. 2

3/4

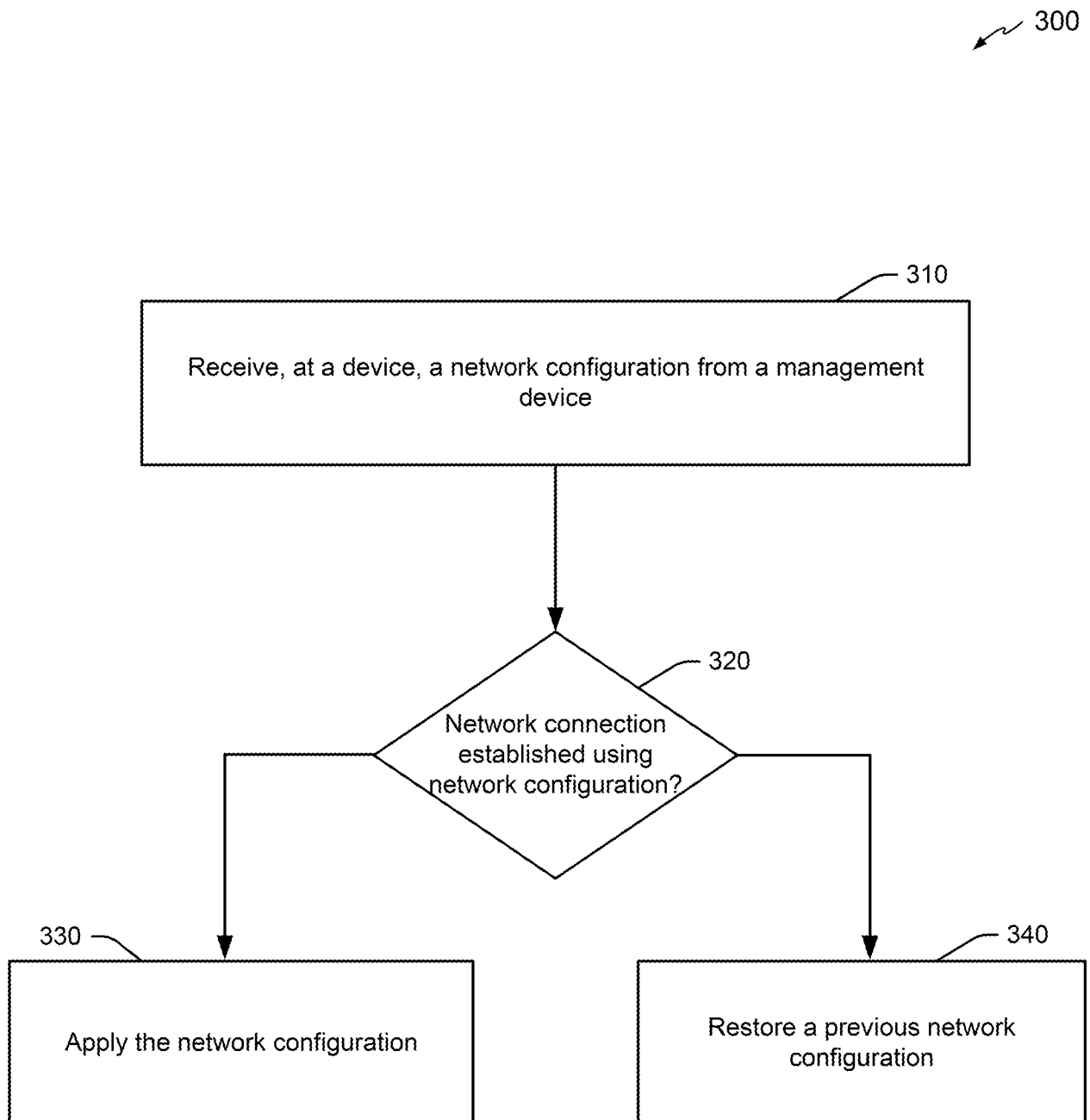


FIG. 3

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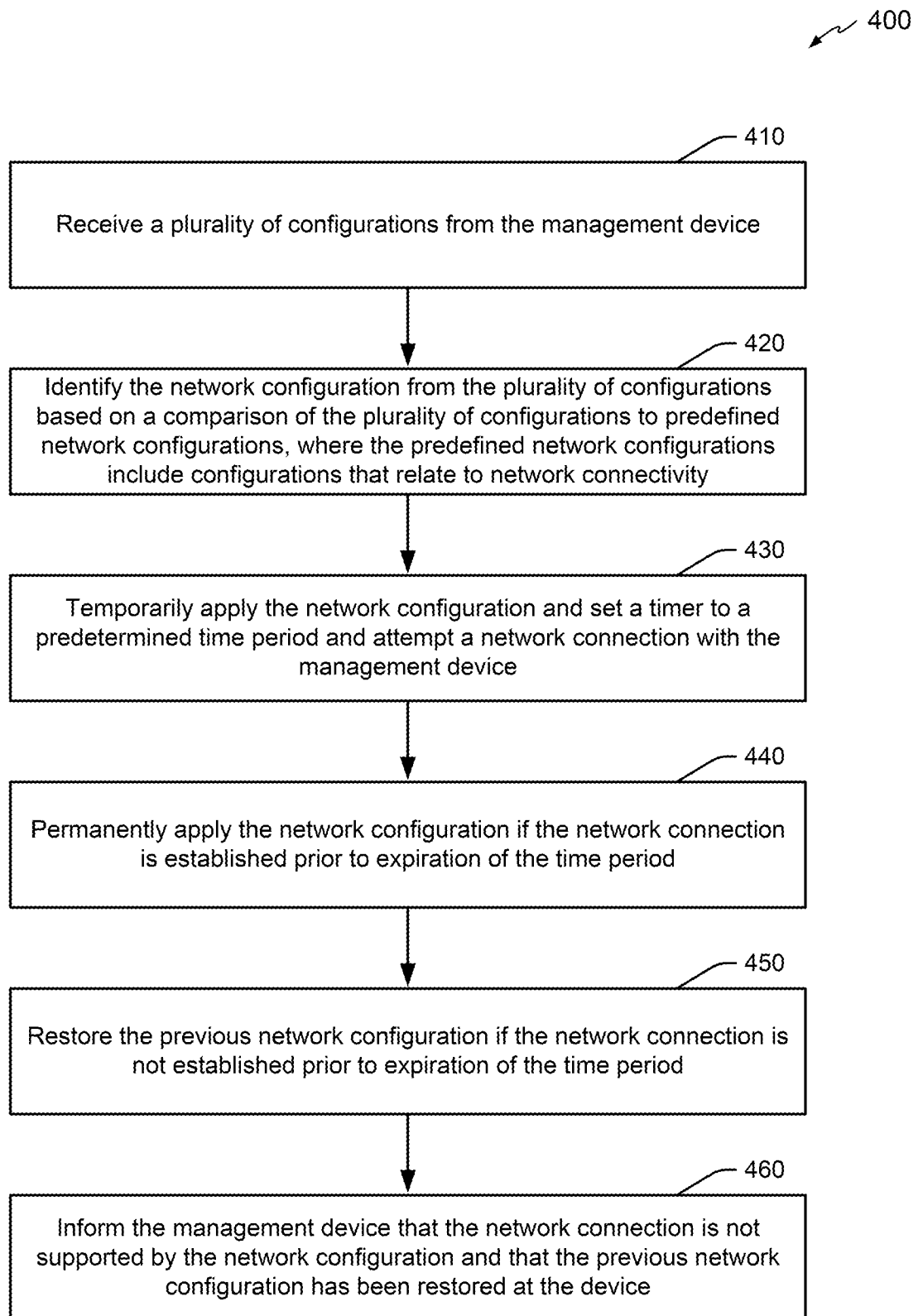


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/020480**A. CLASSIFICATION OF SUBJECT MATTER****H04L 12/24(2006.01)i**

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L 12/24; H04W 24/02; G06F 15/173; H04L 12/26; G06F 15/177; G06F 11/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords :revert, network, device, configuration, remotely, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7290164 B1 (ANDREW G. HARVEY et al.) 30 October 2007 See column 2, lines 44-53; column 3, lines 37-45; column 5, lines 48-65; column 6, lines 30-52; column 7, lines 11-27; column 8, lines 30-42; column 9, lines 8-22; column 9, line 63 - column 10, line 22; figures 1, 2A, 2C-2D, 3A, 4; and claim 18.	1-15
A	US 2014-0031025 A1 (BRIAN MARTIN et al.) 30 January 2014 See paragraphs [0019]-[0034]; and figures 1-3.	1-15
A	US 2006-0080425 A1 (FRANK J. WOOD et al.) 13 April 2006 See paragraphs [0010]-[0019]; and figures 1-4.	1-15
A	US 8248958 B1 (VINUTH TULASI et al.) 21 August 2012 See column 5, line 16 - column 9, line 51; and figures 1-2.	1-15
A	US 2004-0199611 A1 (SVEN BERNHARD et al.) 07 October 2004 See paragraphs [0017]-[0037]; and figures 1b-5.	1-15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search

09 December 2015 (09.12.2015)

Date of mailing of the international search report

11 December 2015 (11.12.2015)

Name and mailing address of the ISA/KR

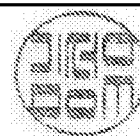
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/020480

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7290164 B1	30/10/2007	None	
US 2014-0031025 A1	30/01/2014	CN 103444214 A EP 2506614 A1 EP 2506614 B1 EP 2523420 A2 GB 2480127 A GB 2480127 B JP 2014-527317 A KR 10-2014-0022040 A US 08412159 B2 US 08417220 B2 US 2012-0252404 A1 US 2012-0252406 A1 WO 2012-131661 A1	11/12/2013 03/10/2012 10/12/2014 14/11/2012 09/11/2011 16/05/2012 09/10/2014 21/02/2014 02/04/2013 09/04/2013 04/10/2012 04/10/2012 04/10/2012
US 2006-0080425 A1	13/04/2006	US 08156207 B2	10/04/2012
US 8248958 B1	21/08/2012	None	
US 2004-0199611 A1	07/10/2004	US 07739693 B2 US 07831734 B2 US 2004-0177361 A1 US 2004-230670 A1	15/06/2010 09/11/2010 09/09/2004 18/11/2004