



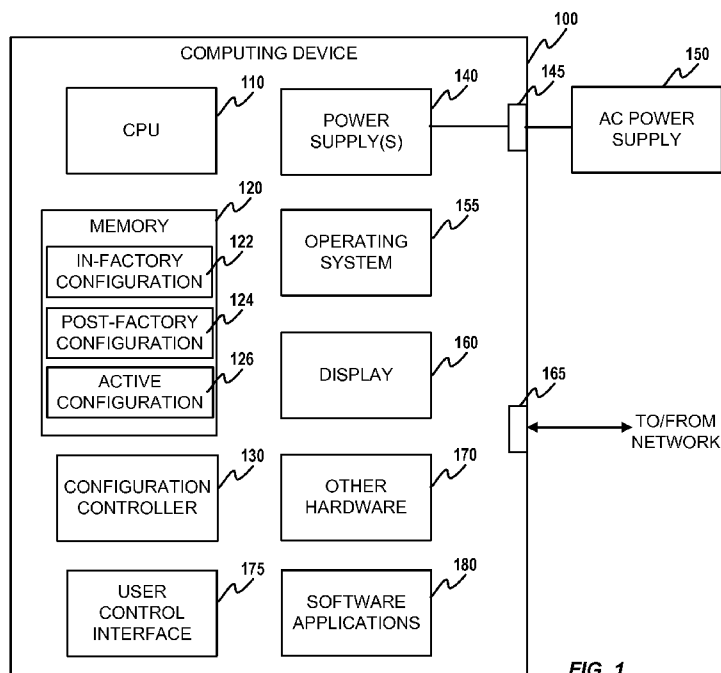
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(54) **Title:** CONFIGURATIONS FOR IN-FACTORY AND POST-FACTORY USE



(57) **Abstract:** An example method includes enabling use of a first configuration for testing a computing device, data indicative of the first configuration being stored in a memory, the memory further storing data indicative of a second configuration, the first configuration enabling at least one function not enabled by the second configuration, the testing including use of functions enabled by the first configuration including the functions not enabled by the second configuration, disabling use of the first configuration subsequent to the testing to prevent use of the functions not enabled by the second configuration; and enabling use of the second configuration for performing functions enabled by the second configuration.

CONFIGURATIONS FOR IN-FACTORY AND POST-FACTORY USE

BACKGROUND

[0001] Products with embedded firmware can require significant testing and/or handling when in the factory being assembled. Such testing and handling may require individuals to access various aspects of components of the products. When products are in the market, an end customer or field engineer often needs to restore the configuration to its initial fresh out of box conditions often called Factory Defaults. However, in the factory, the Factory Defaults are not sufficient and require manual or programmatic changes in the Factory Default configuration.

BRIEF DESCRIPTION OF THE DRAWINGS

[0001] For a more complete understanding of various examples, reference is now made to the following description taken in connection with the accompanying drawings in which:

[0002] Figure 1 illustrates an example computing device; and

[0003] Figure 2 illustrates an example flow diagram for an example process for configuring an example computing device.

DETAILED DESCRIPTION

[0004] Example systems and methods described herein provide an in-factory configuration that may be programmed in firmware, thereby eliminating any manual or programmatic steps to create the configuration needed to handle or test a product in the factory, for example. When testing has been completed, the example systems and methods disable the in-factory configuration and enable a post-factory configuration for the end-user. This saves the factory cost and time for every single assembled unit. For example, factory workers are not required to remember and enter a password for each component or function.

[0005] Some of the differences in configuration requirements within the factory compared to at the customer site include, for example:

- Internet connection (Ipv4 vs ipv6, DHCP vs Static IP, etc.)
- Passwords in the factory are typically a single well known password so as to reduce cost. However, shipping a product with a well-known password is forbidden by security requirements.

[0006] Example systems and methods described herein remove the per-unit cost of manually or programmatically modifying each unit to have a configuration for testing, and replace it with a one-time cost of defining the in-factory configuration for firmware developers to include this in-factory configuration inside the code. Also, firmware controls are added to apply this configuration at the beginning of life of the firmware and to apply the customer configuration (the post-factory configuration) and disable the in-factory configuration (e.g., as the last manufacturing step) after factory testing is complete. A factory system or field engineer can revert back to the in-factory configuration by completely reprogramming the entire portion of memory where the in-factory configuration is stored.

[0007] Referring now to the figures, Figure 1 illustrates an example computing device 100 that may utilize an example configuration controller 130 to selectively control usage of separate default configurations for in-factory testing and for post-factory use. The configuration controller 130 may be implemented in software, firmware and/or hardware. The example computing device 100 may include embedded firmware and hardware components in order to provide for multiple configurations including, a first configuration for in-factory testing and a second configuration for post-factory use (e.g., end customer use). The example computing device 100 may be any type of computing device such as a portable computer or communication device, a standalone server computer, a blade server, etc. The example computing device 100 may include a CPU (central processing unit) 110, at least one memory device 120, and a power supply 140. The power supply 140 is coupled to an electrical interface 145 that is coupled to an external power supply such as an AC power supply 150.

[0008] The computing device 100 may include an operating system component 155 including, for example, an operating system driver component and a pre-boot BIOS (Basic Input/Output System) component stored in ROM (read only memory), and coupled to the CPU 110. In various examples, the CPU 110 may have a non-transitory memory device 120. In various examples, the memory device 120 may have one or more of ROM, programmable flash memory or erasable programmable ROM (EPROM). In various examples, the memory device 120 may be integrally formed with the CPU 120 or may be an external memory device. The memory device 120 may include program code that may be executed by the CPU 120. For example, one or more processes may be performed to execute a user control interface 175 and/or software applications 180.

[0009] The memory device 120 also stores data 122 indicative of the in-factory configuration and data 124 indicative of the post factory configuration. The memory device 120 also provides a portion of memory 126 designated for the active configuration which may be either the in-factory configuration 122 or the post –factory configuration 124, as described below.

[0010] By separating the configuration data into two separate sets of parameters in non-transitory memory, and defining rules governing how and when each set of parameters is copied into the active configuration portion 126, the computing device 100 may be tested using the in-factory configuration 122 and delivered to the end customer using the post-factory configuration 124 without any specialized manual or programmatic steps. In various examples, the in-factory configuration 122 is designed to enable access to any or all function that the computing device 100 is capable of performing such that each function may be tested. In contrast, the post-factory configuration 124 may be designed to enable access to a first portion of the functions and not enable access to a second portion of the functions. This may be done such that units with different capabilities may be designed for different customers (e.g., one customer may desire a high-end device, one customer may desire a medium capability device and another customer may desire a low-end device.

[0011] The memory 120 provides a disabling component that may be used to disable the use of the in-factory configuration 122 and prevent an end-user from reverting back to the in-factory configuration 122. In various examples, the disabling component is a flag that is preset to a first value enabling use of the in-factory configuration 122 on first power-up of the memory. After testing has been completed, the configuration controller 130 may disable the use of the in-factory configuration 122 by setting the flag to a second value that prevents the configuration controller 130 from reverting to the in-factory configuration 122.

[0012] In various examples, the in-factory configuration 122 and the post-factory configuration 124 are stored in reprogrammable memory. In these examples, the disabling component can be reset electronically, in the factory or in the field, and new versions of the in-factory configuration 122 and/or the post-factory configuration 124 may be stored into the reprogrammable memory subsequent to resetting the disabling component.

[0013] In various examples, the in-factory configuration 122 may have low-level security settings. For examples, the settings may include no password or a commonly shared password used factory-wide. Having no password or a commonly shared password may speed up the

testing process. In various examples, the memory 120 provides a protected portion of memory, separate from the in-factory configuration 122 or the post-factory configuration 124, which is reserved for a unique password (sometimes referred to as an administrator password) that is in no other similar computing device or system. Installation of this unique password into the protected portion of the memory 120 may act as a triggering event telling the configuration controller 130 that the factory testing work is done and the computing device 100 is ready for the customer. Upon permanent storage of this unique password, the configuration controller 130 may then copy the post-factory configuration 124 into the active configuration memory portion 126. In various examples, as described above, the configuration controller 130 may store a flag in non-erasable, nonprogrammable, non-customer-accessible memory to prevent reversal of this transition.

[0014] The computing device 100 may also include a display 160, a network interface 165 and other hardware 170 known to those skilled in the art. The network interface 165 may be coupled to a network such as an intranet, a local area network (LAN), a wireless local area network (WLAN), the Internet, etc., where the other underlying components are a part of the network or at least coupled to the network.

[0015] The display 160 may be used to display test results during the testing of the computing device 100. The network interface 165 may be used to receive test signals from testing equipment during the testing of the computing device 100. The network interface may also be used to communicate test results or feedback to the testing equipment.

[0016] Figure 2 illustrates an example flow diagram for an example process 200 for testing a device, such as the computing device 100 of Figure 1, which utilizes separate default configurations for in-factory testing and post-factory use. The process 200 is exemplary only and may be modified. The example process 200 of Figure 2 will now be described with further references to Figure 1.

[0017] Referring now to Figure 2, the in-factory configuration data 122 and the post-factory configuration data 124 may be stored into the memory 120 (block 210). For example, the in-factory configuration data 122 and the post-factory configuration data 124 may be stored by an original equipment manufacturer responsible for constructing the CPU 110 or another standalone component of the computing device 100. In addition, as described above, one or both of the in-factory configuration data 122 and the post-factory configuration data 124 may be stored into

reprogrammable memory (e.g., using flashing techniques or other techniques) after electronically resetting the disabling component (e.g., the flag) in the factory or in the field.

[0018] At block 220, the configuration controller 130 enables use of the in-factory configuration 122 for testing. In various examples, the configuration controller 130 enables the in-factory configuration 122 by copying the in-factory configuration 122 into the active configuration portion 126 of the memory 120. The testing may involve the use of all functions enabled by the in-factory configuration 122 (which may be all functions that the computing device 100 is capable of) including the functions not enabled by the post-factory configuration 124.

[0019] At block 230, the configuration controller 130 disables use of the in-factory configuration 122 subsequent to the testing using a disabling component in the memory 120 to prevent use of the in-factory configuration 122 and any functions not enabled by the post-factory configuration 124. In various examples, the disabling component may a flag preset to a first value enabling use of the in-factory configuration 122 on first power-up of the memory. In these examples, the configuration controller 130 disables the use of the in-factory configuration 122 by setting the flag to a second value that prevents the configuration controller 130 from reverting to the in-factory configuration.

[0020] At block 240, the configuration controller 130 enables use of the post-factory configuration 124 for performing functions enabled by the post-factory configuration 124. The functions enabled by the post-factory configuration 124 may not be all of the functions that the computing device is capable of, as described above. In various examples, the configuration controller 130 enables the post-factory configuration 124 by copying the post-factory configuration 124 into the active configuration portion 126 of the memory 120.

[0021] In various examples, at block 240, a unique password for using the post-factory configuration 124 may be stored into a protected portion of the memory 120. As described above, the storing this unique password into the protected portion of the memory 120 may act as a triggering event resulting in the configuration controller 130 performing the enabling of the post-factory configuration 124 at block 240.

[0022] Various examples described herein are described in the general context of method steps or processes, which may be implemented in one example by a software program product or component, embodied in a machine-readable medium, including executable instructions, such as

program code, executed by entities in networked environments. Generally, program modules may include routines, programs, objects, components, data structures, etc. which may be designed to perform particular tasks or implement particular abstract data types. Executable instructions, associated data structures, and program modules represent examples of program code for executing steps of the methods disclosed herein. The particular sequence of such executable instructions or associated data structures represents examples of corresponding acts for implementing the functions described in such steps or processes.

[0023] Software implementations of various examples can be accomplished with standard programming techniques with rule-based logic and other logic to accomplish various database searching steps or processes, correlation steps or processes, comparison steps or processes and decision steps or processes.

[0024] The foregoing description of various examples has been presented for purposes of illustration and description. The foregoing description is not intended to be exhaustive or limiting to the examples disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of various examples. The examples discussed herein were chosen and described in order to explain the principles and the nature of various examples of the present disclosure and its practical application to enable one skilled in the art to utilize the present disclosure in various examples and with various modifications as are suited to the particular use contemplated. The features of the examples described herein may be combined in all possible combinations of methods, apparatus, modules, systems, and computer program products.

[0025] It is also noted herein that while the above describes examples, these descriptions should not be viewed in a limiting sense. Rather, there are several variations and modifications which may be made without departing from the scope as defined in the appended claims.

WHAT IS CLAIMED IS:

1. A device, comprising:

a memory storing data indicative of a first configuration for in-factory use and data indicative of a second configuration for post-factory use, the first configuration enabling at least one function not enabled by the second configuration; and

a processor to execute a configuration controller, the configuration controller to:

enable use of the first configuration for testing, the testing including use of functions enabled by the first configuration including the functions not enabled by the second configuration;

disable use of the first configuration subsequent to the testing to prevent use of the functions not enabled by the second configuration; and

enable use of the second configuration for performing functions enabled by the second configuration.

2. The device of claim 1, wherein the first configuration data and the second configuration data are stored in reprogrammable memory.

3. The device of claim 1, wherein the memory includes a disabling component for disabling use of the first configuration, wherein the disabling component comprises a flag preset to a first value enabling use of the first configuration on first power-up of the memory and the configuration controller disables use of the first configuration by setting the flag to a second value that prevents the configuration controller from reverting to the first configuration.

4. The device of claim 1, wherein the first configuration has a low-level security settings.

5. The device of claim 1, wherein, the configuration controller enables the first configuration and the second configuration by copying the first configuration and the second configuration, respectively, into an active configuration portion of the memory.

6. The device of claim 1, wherein a unique password for using the second configuration is stored into a protected portion of the memory when the configuration controller enables the use of the second configuration.

7. A method, comprising:

enabling use of a first configuration for testing a computing device, data indicative of the first configuration being stored in a memory, the memory further storing data indicative of a second configuration, the first configuration enabling at least one function not enabled by the second configuration, the testing including use of functions enabled by the first configuration including the functions not enabled by the second configuration;

disabling use of the first configuration subsequent to the testing to prevent use of the functions not enabled by the second configuration; and

enabling use of the second configuration for performing functions enabled by the second configuration.

8. The method of claim 7, wherein the first configuration data and the second configuration data are stored in reprogrammable memory, the method further comprising:

storing new versions of at least one of the first configuration data or the second configuration data into the reprogrammable memory.

9. The method of claim 7, wherein the memory includes a disabling component for disabling use of the first configuration, wherein the disabling component comprises a flag preset to a first value enabling use of the first configuration on first power-up of the memory, the method further comprising disabling use of the first configuration by setting the flag to a second value that prevents reverting to the first configuration.

10. The method of claim 7, wherein, enabling the first configuration and the second configuration comprises copying the first configuration and the second configuration, respectively, into an active configuration portion of the memory.

11. The method of claim 7, further comprising storing a unique password for using the second configuration into a protected portion of the memory when enabling the use of the second configuration.

12. A computer program product, embodied on a non-transitory computer-readable medium, comprising:

computer code to enable use of a first configuration for testing a computing device, data indicative of the first configuration being stored in a memory, the memory also storing data indicative of a second configuration, the first configuration enabling at least one function not enabled by the second configuration, the testing including use of functions enabled by the first configuration including the functions not enabled by the second configuration;

computer code to disable use of the first configuration subsequent to the testing to prevent use of the functions not enabled by the second configuration; and

computer code to enable use of the second configuration for performing functions enabled by the second configuration.

13. The computer program product of claim 12, wherein the first configuration data and the second configuration data are stored in reprogrammable memory, the computer program product further comprising:

computer code to store new versions of at least one of the first configuration data or the second configuration data into the reprogrammable memory.

14. The computer program product of claim 12, wherein the memory includes a disabling component for disabling use of the first configuration, wherein the disabling component comprises a flag preset to a first value enabling use of the first configuration on first power-up of the memory, the computer program product further comprising computer code for disabling use of the first configuration by setting the flag to a second value that prevents reverting to the first configuration.

15. The computer program product of claim 12, wherein, the computer code for enabling the first configuration and the second configuration comprises computer code for copying the first

configuration and the second configuration, respectively, into an active configuration portion of the memory.

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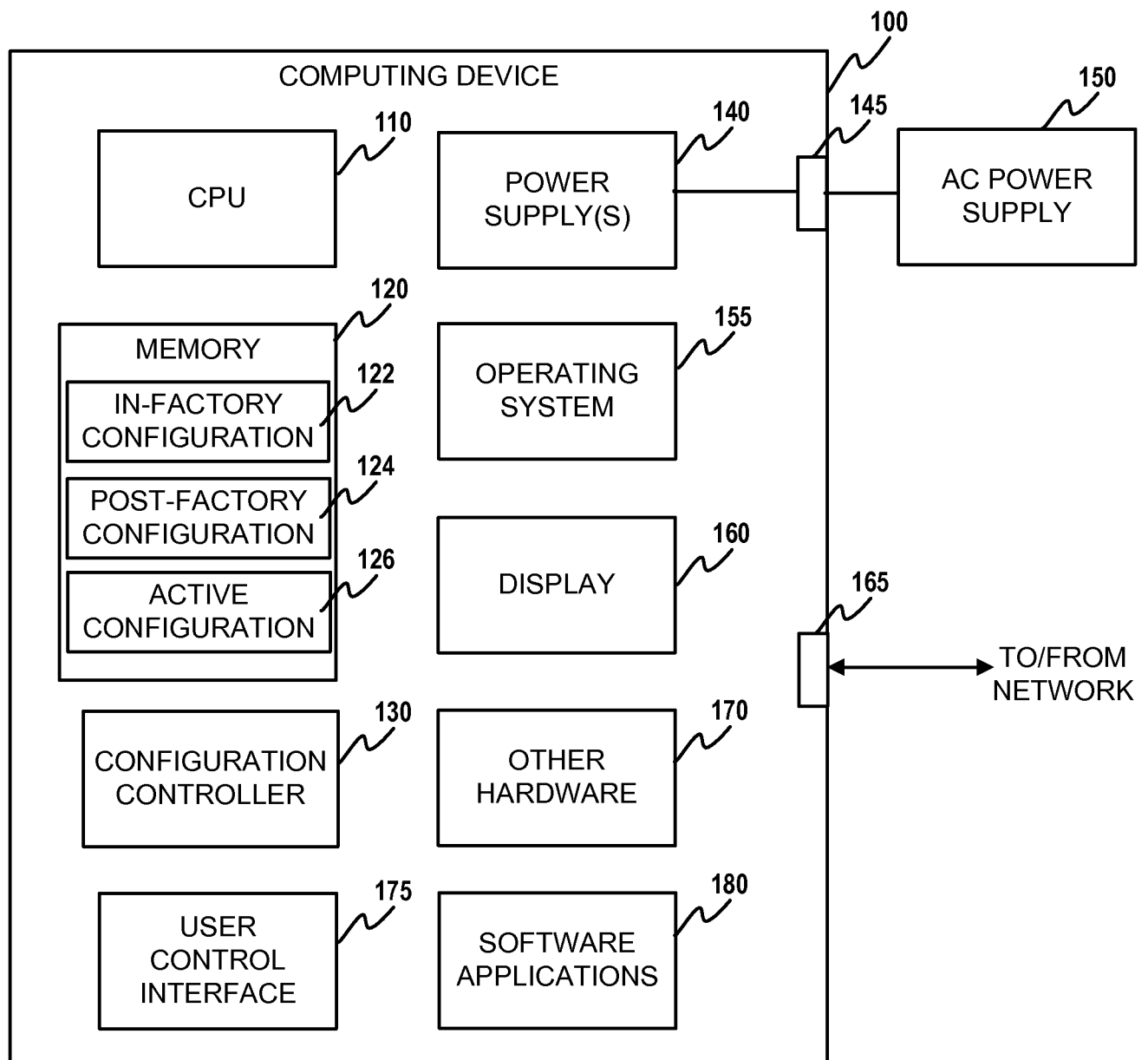
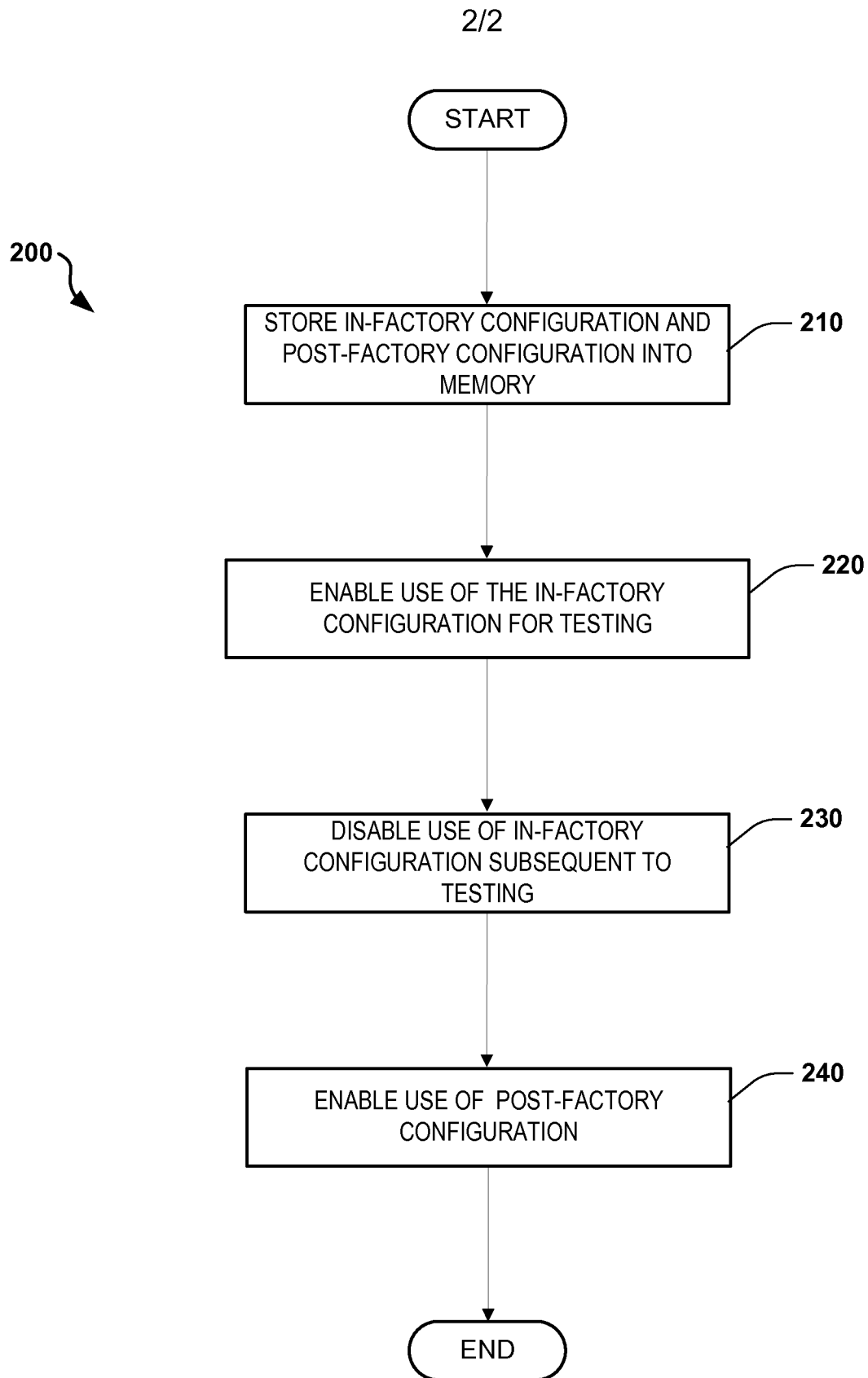


FIG. 1

**FIG. 2**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/014010**A. CLASSIFICATION OF SUBJECT MATTER****G06F 11/26(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)

G06F 11/26; G06F 9/44; G06F 9/00; 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: in-factory use, post-factory use, first configuration, second configuration, 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 2006-0020844 A1 (PATRICK L. GIBBONS et al.) 26 January 2006 See paragraphs [0026], [0033]-[0036], and [0042]; claim 1; and figure 2A.	1-3,5,7-10,12-15
Y		4,6,11
Y	US 2007-0255934 A1 (LOWELL B. DENNIS) 01 November 2007 See paragraphs [0019]-[0020] and figures 2-3.	4,6,11
A	WO 2012-175495 A1 (THOMSON LICENSING) 27 December 2012 See page 4, line 30 - page 5, line 9; page 7, line 31 - page 8, line 24; and figure 1.	1-15
A	US 2006-0265582 A1 (CHAO-TSUNG FAN et al.) 23 November 2006 See paragraphs [0006] and [0016]; and figure 4.	1-15
A	US 6,353,885 B1 (DIRIE HERZI et al.) 05 March 2002 See column 3, lines 26-45; column 4, lines 1-9; and figure 2.	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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 October 2015 (30.10.2015)

Date of mailing of the international search report

30 October 2015 (30.10.2015)

Name and mailing address of the ISA/KR

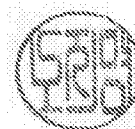
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/014010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0020844 A1	26/01/2006	None	
US 2007-0255934 A1	01/11/2007	US 7577829 B2	18/08/2009
WO 2012-175495 A1	27/12/2012	None	
US 2006-0265582 A1	23/11/2006	CN 100405297 C CN 1866207 A	23/07/2008 22/11/2006
US 6353885 B1	05/03/2002	None	