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APPLICATION FOR PATENT

ON

AUTOMATED PERIODIC CENTRALIZED BACKUP OF USER ENVIRONMENTS

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AUTOMATED PERIODIC CENTRALIZED BACKUP OF USER ENVIRONMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit under 35 U.S.C. § 119(e) of United States Provisional Application Serial Number 60/923,469, filed April 13, 2007, which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure generally relates to the field of computing devices, and more particularly to backing up operating environments for computing devices.

BACKGROUND

[0003] There are a wide variety of computing devices which include data capable of replication. Computing devices include, but are not limited to, mobile devices such as MP3 (MPEG-1 Audio Layer 2) players, cellular telephones and/or personal digital assistants; desktop devices such as desktop personal digital computers, laptop personal digital computers, mainframe computers, minicomputers, storage devices, CMOS (complimentary metal oxide semiconductor) devices, and/or NVRAM (non-volatile random access memory); and/or other computing devices such as router cores, computer appliances and/or BIOS (basic input/output system). Computing devices may be incorporated into networks of computing devices. Computing devices may experience a variety of failures or problems.

SUMMARY

[0004] A system and method may classify and combine the elements of a user environment into a logical entity and then back the logical entity to an operating environment of a central environment storage area. The user environment may comprise two or more modifiable digital device entities, coupled by one or more interfaces, involved in a dependency relationship. Configurable external devices may be logically tied together to the user environment. The present disclosure may also monitor the user environment during utilization and read from and/or write to the operating environment of the central environment storage area at login (including, but not limited to, an initial login), logoff, or after a certain period of time has expired. It should be noted that login and logoff may comprise a situation where an end user must login and/or logoff of a user environment utilizing by supplying a user identification and/or password, but may also comprise simply initiating the user environment. For example, a login may comprise booting up a modifiable digital device entity.

[0005] The system and method may also restore the user environment utilizing one or more logical entities stored in the operating environment of the central environment storage area. An end user may be provided with emergency backup disks and/or files of the entire user environment from any point in time, including the end user's customization. The emergency backup disks and/or the files may enable to end user to restore the user environment to a particular point in time.

[0006] The central environment storage area may provide a means to organize and backup information such that data may be more efficiently managed, saving valuable storage space. Centralization may enable vendors

(including, but not limited to, hardware and software vendors) to access a an area of a vendor repository of the central repository, specific to their product, and upload product related data (including, but not limited to BIOS, router cores, updates, fixes, installs, operating system software, and/or application programs). End users may then be able to authorize the application of the vendor uploaded data (including, but not limited to, updates, fixes and installs) to the operating environment of the environmental storage area and/or the user environment.

[0007] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not necessarily restrictive of the present disclosure. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate subject matter of the disclosure. Together, the descriptions and the drawings serve to explain the principles of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The numerous advantages of the disclosure may be better understood by those skilled in the art by reference to the accompanying figures in which:

FIG. 1A is a block diagram illustrating a system for automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure;

FIG. 1B is a block diagram illustrating a system for automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure;

FIG. 2 is a block diagram illustrating the definition of elements that comprise the user environment of FIG. 1A and 1B by an end user utilizing a user interface, in accordance with an embodiment of the present disclosure;

FIG. 3 is a block diagram illustrating the storage of various logical entities in the environmental storage area of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 4 is a block diagram illustrating a logical entity for the user environment of FIG. 1A and 1B recorded subsequent to the recording of the first logical entity, in accordance with an embodiment of the present disclosure;

FIG. 5 is a block diagram illustrating the process of backing up the user environment of FIG. 1A and 1B to the environmental storage area of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 6 is a block diagram illustrating changes to the user environment of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 7 is a flow chart illustrating a process in the user environment of FIG. 1A and 1B for storing changes for the user environment of FIG. 1A and 1B to the environmental storage area of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 8 is a flow chart illustrating a process in the vendor repository of FIG. 1A and 1B for storing vendor updates for the repository of FIG. 1A and 1B to the environmental storage area of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 9 is a block diagram illustrating examples of events which may trigger the recordation of changed elements of the user environment of FIG. 1A and 1B in the environmental storage area of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 10 is a block diagram illustrating dynamic storage space of the environmental storage area of FIG. 1A and 1B for storing one or more logical entities of the user environment of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 11 is a block diagram illustrating the relationship among interfaces for controlling the system of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 12 is a block diagram illustrating a example section of a flat file logical entity for the user environment of FIG. 1A and 1B recorded subsequent to the recording of the first logical entity, in accordance with an embodiment of the present disclosure;

FIG. 13 is a block diagram illustrating multiple server farms of the repository of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 14 is a block diagram illustrating an example of a storage file for the repository of FIG. 1A and 1B, in accordance with an embodiment of the present disclosure;

FIG. 15 illustrates a process of storage in the operating environment of the environment storage area, in accordance with an embodiment of the present disclosure;

FIG. 16 illustrates a process of storage in the vendor repository of the environment storage area, in accordance with an embodiment of the present disclosure;

FIG. 17 is a block diagram illustrating a system for backing up an operating environment for at least one computing device, in accordance with an alternative embodiment of the present disclosure;

FIG. 18 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure;

FIG. 19 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure;

FIG. 20 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure;

FIG. 21 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure;

FIG. 22 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure;

FIG. 23 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure; and

FIG. 24 is a flow diagram illustrating a method for automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure.

DETAILED DESCRIPTION

[0009] Reference will now be made in detail to the subject matter disclosed, which is illustrated in the accompanying drawings.

[0010] Modifiable digital device entities and networks may be typically customized with unique sets of hardware, software, firmware, and settings. Over time, users of the modifiable digital device entities and networks may experience hardware failure, software issues, and networking conflicts. User error or security breaches may result in the destruction of data. Incorrect BIOS (basic input/output system) settings may prevent a modifiable digital device entity from booting or operating correctly. Changes to router cores may cause a network to have incorrect or little to no connectivity. Modifiable digital device entities may be introduced into a user environment (including,

but not limited to, via cabled interfaces, wireless routers/access points, and/or on-board expansion ports) and may cause conflicts and/or other problems in the user environment for one or more modifiable digital device entities and/or networks. Additionally, firmware updates for one or more modifiable digital device entities may be required and/or may cause problems in the user environment.

[0011] A modifiable digital device entity may comprise any digital device entity that includes data that may be modified by an end user or indirectly by a vendor. A modifiable digital device entity may include, but is not limited to mobile devices such as MP3 (MPEG-1 Audio Layer 2) players, cellular telephones, and/or personal digital assistants; desktop devices such as desktop personal digital computers, laptop personal digital computers, mainframe computers, minicomputers, storage devices, CMOS (complimentary metal oxide semiconductor) devices, and/or NVRAM (non-volatile random access memory) devices; and/or other devices such as router cores, computer appliances, and/or BIOS. A modifiable digital device entity may include other modifiable digital device entities. A modifiable digital device entity may comprise a modifiable digital device item if the modifiable digital device entity is not incorporated into another modifiable digital device entity. For example, a modifiable digital device entity may comprise a desktop computer. The desktop computer may include a BIOS and a hard drive. The desktop computer may be a modifiable digital device entity because the desktop computer includes data that may be modified by an end user (i.e. data may be stored or altered on the hard drive and/or the BIOS may be updated by an end user). The desktop computer may be a modifiable digital device item because the desktop computer is not incorporated into another modifiable digital device entity. The desktop computer may include a BIOS and a hard drive. The BIOS may be a modifiable digital device entity

because the BIOS includes data that may be modified by an end user (i.e. an end user may update the BIOS). The BIOS may not be a modifiable digital device item because the BIOS is incorporated into the desktop computer. The hard drive may include a hard disk and/or firmware. The hard drive may be a modifiable digital device entity because the hard drive includes data that may be modified by an end user (i.e. data may be stored or altered on the hard disk and/or the firmware may be updated by an end user). The hard drive may not be a modifiable digital device item if the hard drive is incorporated into the desktop computer (although the hard drive may be a modifiable digital device item if the hard drive is removable and is thusly not incorporated into the desktop computer). The hard disk may be a modifiable digital device entity because the hard disk includes data that may be modified by an end user (i.e. data may be stored or altered on the hard disk). The hard drive may not be a modifiable digital device item because the hard disk is incorporated into the hard drive. The firmware may be a modifiable digital device entity because the firmware includes data that may be modified by an end user (i.e. the firmware may be updated by an end user). The firmware may not be a modifiable digital device item if the hard drive is incorporated into the hard drive.

[0012] A user environment may comprise two or more modifiable digital device entities, coupled by one or more interfaces, involved in a dependency relationship. Two or more modifiable digital device entities, coupled by one or more interfaces, may be involved in a dependency relationship when one of the modifiable digital device entities is dependent upon one or more of the other modifiable digital device entities for one or more aspects of operation. One or more of the modifiable digital device entities may comprise a modifiable digital device item. The user environment may include a modifiable digital device group. A modifiable digital device group is a group of

identical modifiable digital device items. For example, a user environment may comprise a laptop computer, which includes a hard drive and a BIOS, coupled to a router. The laptop computer may be coupled to the router via a network interface (including, but not limited to Ethernet and/or token ring). The laptop computer may be coupled to the hard drive via a hard drive interface (including, but not limited to IDE (integrated drive electronics), SATA (serial advanced technology attachment), and/or SCSI (small computer system interface). The laptop computer may be coupled to the BIOS via an electronic circuit interface. The hard drive may include a hard disk and/or hard drive firmware. The hard drive may be coupled to the hard disk via an electronic circuit interface. The hard drive may be coupled to the hard drive firmware via an electronic circuit interface. The router may include router firmware. The router may be coupled to the router firmware via an electronic circuit interface. The laptop computer may be a modifiable digital device entity because the laptop computer includes data that may be modified by an end user (i.e. data may be stored or altered on the hard drive and/or the BIOS may be updated by an end user). The laptop computer may be a modifiable digital device item because the laptop computer is not incorporated into another modifiable digital device entity. The BIOS may be a modifiable digital device entity because the BIOS includes data that may be modified by an end user (i.e. an end user may update the BIOS). The BIOS may not be a modifiable digital device item because the BIOS is incorporated into the desktop computer. The hard drive may be a modifiable digital device entity because the hard drive includes data that may be modified by an end user (i.e. data may be stored or altered on the hard disk and/or the hard drive firmware may be updated by an end user). The hard drive may not be a modifiable digital device item if the hard drive is incorporated into the desktop computer (although the hard drive may be a modifiable digital device item if the hard drive is removable and is thusly not incorporated into the desktop

computer). The hard disk may be a modifiable digital device entity because the hard disk includes data that may be modified by an end user (i.e. data may be stored or altered on the hard disk). The hard drive may not be a modifiable digital device item because the hard disk is incorporated into the hard drive. The hard drive firmware may be a modifiable digital device entity because the hard drive firmware includes data that may be modified by an end user (i.e. the hard drive firmware may be updated by an end user). The hard drive firmware may not be a modifiable digital device item if the hard drive is incorporated into the hard drive. The router may be a modifiable digital device entity because the router includes data that may be modified by an end user (i.e. a router core stored in the router firmware may be modified by an end user). The router may be a modifiable digital device item because the router is not incorporated into another modifiable digital device entity. The router firmware may be a modifiable digital device entity because the router firmware includes data that may be modified by an end user (i.e. a router core stored in the router firmware may be modified by an end user). The router firmware may not be a modifiable digital device item because the router firmware is incorporated into the router. In this example, there may be a dependency relationship between the laptop computer, the BIOS, the hard drive, the hard disk, the hard drive firmware, the router and the router firmware. The laptop computer may be dependent upon the BIOS for booting, or the basic input output services that prepare the laptop computer so that software programs may load, execute, and/or take control of the laptop computer. The laptop computer may be dependent upon the hard drive for storage of one or more operating systems, application programs, and/or data. The laptop computer may be dependent upon the router for connection to network services. The hard drive may be dependent upon the hard disk for storage of data. The hard drive may be dependent upon the hard drive firmware for booting and operating. The router may be dependent

upon the router firmware for booting, operating, and storage of one or more router cores. Further, the user environment may further comprise a network file server coupled to the router via a network interface (including, but not limited to, a wireless network interface, an Ethernet interface, and/or a token ring interface). The network file server may be a modifiable digital device entity because the file server includes data that may be modified by an end user (i.e. files may be stored or altered). The file server may be a modifiable digital device item because the file server is not incorporated into another modifiable digital device entity. The laptop computer may be dependent upon the file server for access to stored files.

[0013] Restoration of a user environment may involve changing many different aspects of one of more modifiable digital device entities in the user environment. If one or more operating systems and/or application programs of the one or more modifiable digital device entities are corrupt, an end user may perform a fresh installation of the one or more operating systems and/or application programs. This may not be an optimal solution for dealing with a corrupt system, as many system settings and customizations may be lost in the process.

[0014] Restoration of a user environment back to a particular working state may be a time consuming and expensive task, both for end users and vendors. Application of service packs, upgrades, updates, and/or bug fixes may cause vendors to experience an influx of end user service calls. Purchase of software is decentralized and there are no standards for software distribution. With potentially millions of customers, redundancy of operating system and application program code (in backing up systems) may be wasteful and inefficient. Websites for shareware and/or other downloadable software have made it possible to recover application programs (through

support options). However, end users may lose a required installation key, their downloadable software, or both. These factors may combine to increase administrative costs for vendors.

[0015] Traditional backups offer businesses and individuals protection from catastrophic data loss, but may only partially address the situation. Websites such as http://zdrive.com offer the running of offsite backups via the Internet. System restore in the Windows operating systems offer real time monitoring at the hard drive level. Volume level backups of the data of a hard drive may be accomplished by ghosting a volume or through utilization of a RAID (redundant array of independent disks). Traditional backup methods do not entirely address the situation, because they do not address the entire user environment. Ghosting a drive is time intensive. System restore does not always save user state data, but rather a subset of user environment at certain times. RAID implementations mirror a volume, but do not encompass the user environment as a whole.

[0016] A system and method may classify and combine the elements of an user environment (the user environment comprising two or more modifiable digital entities, coupled by one or more interfaces, involved in a dependency relationship) into a logical entity and then back the logical entity to a operating environment in an environmental storage area. The modifiable digital device entities may be logically tied together to form the user environment. The modifiable digital device entities may be classified and combined via the one or more interfaces. The present disclosure may also monitor the user environment during utilization and read from and/or write to the environmental storage area at login (including, but not limited to, an initial login), logoff, or after a certain period of time has expired. The modifiable digital device entities may be monitored via the one or more interfaces. It should be noted

that login and logoff may comprise a situation where an end user must login and/or logoff of a user environment and/or a modifiable digital device entity of the user environment utilizing by supplying a user identification and/or password, but may also comprise simply initiating the user environment a modifiable digital device entity of the user environment. For example, a login may comprise booting up a modifiable digital device entity.

[0017] The system and method may also restore the user environment utilizing one or more logical entities stored in the operating environment in the environmental storage area. An end user may be provided with emergency backup disks and/or files of the entire user environment from any point in time, including the end user's customization. The emergency backup disks and/or the files may enable to end user to restore the user environment to a particular point in time.

[0018] The environmental storage area may provide a means to organize and backup information such that data may be more efficiently managed, saving valuable storage space. Centralization may enable vendors (including, but not limited to, hardware and software vendors) to access a vendor repository of the environmental storage area, specific to their product, and upload product related data (including, but not limited to BIOS, firmware router cores, updates, fixes, installs, operating system software, and/or application programs). End users may then be able to authorize the application of the vendor uploaded data (including, but not limited to, updates, fixes and installs) to their operating environment and/or their user environment. The present disclosure may also monitor one or more vendors for vendor updates and transfer those vendor updates (time stamped) to a vendor repository in an environmental storage area for storage.

[0019] FIGS. 1A and 1B illustrate a system 100 automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. The system 100 comprises a user environment 101 for at least one computing device, an environment storage area 102 (which may comprise an operating environment 107 and/or a vendor repository 108), and a type of transfer 104. The user environment may comprise two or more modifiable digital entities, coupled by one or more interfaces, involved in a dependency relationship. The elements of the user environment 101 may be categorized and classified 103 to combine the elements into a single logical entity. Then, the logical entity may be transferred to the operating environment 107 of the environment storage area 102 utilizing the type of transfer 104. One or more logical entities from the operating environment 107 of the environment storage area 102 may be transferred to the user environment 101 utilizing the type of transfer 104 and may be de-categorized and de-classified 105 and may be utilized to restore the user environment to a particular previous point in time. One or more vendors 106 may be able to access one or more vendor segments of the vendor repository 108 of the environment storage area 102, specific to their product, and upload product related data (including, but not limited to BIOS, router cores, updates, fixes, installs, operating system software, and/or application programs). An end user of the user environment 101 may then be able to authorize the application of the vendor uploaded data (including, but not limited to, updates, fixes and installs) to the operating environment 107 of the environment storage area 102 and/or the user environment 101. One or more vendors 106 may monitored for vendor updates which may then be transferred to the vendor repository 108 of the environment storage area 102.

[0020] The user environment 101 may include one or more modifiable digital device entities (including, but not limited to mobile devices such as MP3

(MPEG-1 Audio Layer 2) players, cellular telephones, and/or personal digital assistants; desktop devices such as desktop personal digital computers, laptop personal digital computers, mainframe computers, minicomputers, storage devices, CMOS (complimentary metal oxide semiconductor) devices, and/or NVRAM (non-volatile random access memory) devices; and/or other devices such as router cores, computer appliances, and/or BIOS). The elements of the user environment 101 may include, but is not limited to, operating system data, application program data, computer device settings, network settings, BIOS, router cores, end user data, firmware, external device settings, computer device component (physical and/or logical) settings, and/or end user preferences. The user environment 101 may include elements that are internal elements (including, but not limited to, a hard drive that is internal to a computer, firmware that is internal to a router, and/or BIOS that is internal to a computer) and/or elements that are external elements (including, but not limited to, router that is not incorporated into another modifiable digital device entity and/or a computer that is not incorporated into another modifiable digital device entity). Elements of the user environment 101 may be automatically discovered (including, but not limited to operating systems, application programs, end user data, and/or other automatically discovered elements) utilizing one or more computing devices or application programs of the user environment 101. Elements of the user environment 101 may be manually discovered (including, but not limited to firmware, BIOS, router cores, and/or other manually discovered elements) where an end user or administrator may be required to manually discover elements of the user environment 101 utilizing means including, but not limited to, configuration of a default file and/or a web interface. The elements that comprise the user environment 101 may be defined by an end user or an administrator.

[0021] The environment storage area 102 may include one or more file systems and one or more storage devices (including, but not limited to, one or more hard disk drives, tape drives, optical drives, flash drives, solid state drives, and/or memories). The environment storage area 102 may include one more servers, or one or more farms of servers (as illustrated in FIG. 13), which include one or more storage devices. The environment storage area 102 may span more than one physical location.

[0022] The type of transfer 104 may comprise any means of transferring from the operating environment 101 to and/or from the repository 102. The type of transfer 104 may comprise a direct transport means. The type of transfer 104 may comprise a wired connection (including, but not limited to, an Ethernet connection, a token ring connection, a fiber connection, and/or a POTS (plain old telephone service) connection), a wireless connection (including, but not limited to, an 802.11a connection, and 802.11b connection, an 802.11g connection, an 802.11n connection, a Bluetooth connection, a cellular connection, a satellite connection, a microwave connection, a radio connection, and/or an infra-red connection). Alternatively, the type of transfer 104 may comprise an indirect transport means. The type of transfer 104 may comprise recordation of data to a transfer media which is then transported. The transfer media may comprise any media for storing data including, but not limited to, hard disk drives (including, but not limited to, removable hard disk drives), solid state drives (including, but not limited to, removable solid state drives), DVDs (digital video disks), CDs (compact disks), flash media, backup services (such as those offered at http://zdrive.com) and/or attached storage devices such as storage area network devices, network attached storage devices, and/or direct attached storage devices. Transportation of the transfer media may comprise any means of transportation including, but not limited to, United States Mail, Courier, a common carrier (including, but

not limited to, Federal Express, United Parcel Service, or DHL), a media distribution company or center (including, but not limited to, NetFlix, Blockbuster, Hollywood Video, and/or Video Professor), and/or a website. The type of transfer 104 may be secured utilizing various securing means including, but not limited to Internet Protocol security, secured sockets layer, transport level security, encryption (including, but not limited to Diffie-Hellman encryption, data encryption standard (DES) encryption, RSA encryption, PGP (pretty good privacy) encryption, and/or content scrambling system (CSS)), and/or physical security (including, but not limited to, locks, strongboxes, and/or guards).

[0023] The elements of the user environment 101 may be categorized and classified 103 to combine the elements into a first logical entity at an initial login. The elements of the user environment 101 may be obtained from the modifiable digital devices of the user environment 101 via one or more modifiable digital device entity interfaces. The initial login may comprise the first time that the user environment 101 is utilized or booted up. The first logical entity may be created utilizing one or more vendors' restore and/or installation disks and/or links to online support areas. Subsequent to the creation of the first logical entity, the user environment 101 may be monitored for changes and a timer may be started. One or more modifiable digital device entities of the user environment 101 may be monitored for changes via one or more modifiable digital device entity interfaces. The timer may be configurable by the end user. At the occurrence of an event including, but not limited to, a logoff and/or the expiration of the timer, the elements of the user environment 101 which have changed may be categorized and classified to create a second logical entity. The second logical entity may then be transferred to the operating environment 107 of the environment storage area 102 utilizing the type of transfer 104. Features of the modifiable digital device

entities, such as the hibernate feature in the Windows operating system, may be utilized for categorization, classification, and transfer.

[0024] Various logical entities for the user environment 101 may be stored in the operating environment 107 of the environment storage area 102. The first logical entity may contain the initial state of the user environment 101. Subsequent logical entities may contain the changes to the user environment 101 that occurred subsequent to the previously recorded logical entity. Thus, the first logical entity and all subsequent logical entities recorded between the first logical entity and a particular logical entity contain the state of the user environment 101 at a particular time when the particular logical entity was recorded. The user environment 101 may be restored to the state of the user environment 101 at a particular point in time utilizing the first logical entity, the particular logical entity recorded at the particular time, and all logical entities recorded between the recording of the first logical entity and the particular logical entity.

[0025] FIG. 3 conceptually illustrates the storage of various logical in the environmental storage area 102. It should be noted that this is a conceptual description of the storage of various logical entities in the environmental storage area 102 and it is contemplated that the various logical entities in the environmental storage area 102 may be stored in various ways without departing from the scope of the present disclosure. The initial user environment may represent the first logical entity which may represent the complete initial user environment for the user environment 101. G(1) through G(6) may represent subsequent logical entities which may represent the changes in the user environment 101 since the previous recorded logical entity and/or vendor updates. For example, G(1) may represent the changes in the user environment 101 and/or vendor updates that occurred subsequent

to the recording the first logical entity, or the initial user environment. G(2) may represent the changes in the user environment 101 and/or vendor updates that occurred subsequent to the recording of the second logical entity, or G(1). Thus, the user environment 101 may be restored to the state of the user environment 101 at the time the third logical entity, G(2), was recorded utilizing the initial user environment (the first logical entity), G(1) (the second logical entity), and G(2) (the third logical entity). Alternatively, the G(1) may represent the first logical entity which may represent the complete initial user environment for the user environment 101 and G(2) through G(6) may represent subsequent logical entities which may represent the changes in the user environment 101 and/or vendor updates since the previous recorded logical entity. The first logical entity may be encoded to represent the location of the recorded elements in the user environment 101. As illustrated in FIG. 4A, logical entities recorded subsequent to the first logical entity may be encoded to correlate the changes to their location in the user environment 101. An offset may be encoded to correlate the location of the change in the user environment 101 with the recorded elements of the first logical entity. Control data may be encoded to indicate whether the change is an implicit change (for example, where an end user makes a change and may not need to be authorized to make changes, thus the change may be deemed implicit) or an explicit change (such as a vendor upload including, but not limited to, a Windows Service Pack, a bug fix, a software purchase, a BIOS upgrade, and/or a router core update).

[0026] At the occurrence of an event including, but not limited to, a login, one or more logical entities may be transferred to the user environment 101 utilizing the type of transfer 104, de-categorized and de-classified 105, and utilized to restore the user environment 101 to the particular point in time of the last logoff.

[0027] FIG. 5 illustrates the process of backing up the operating environment 101 of FIG. 1 to the repository 102 of FIG. 1. A current state 401B of the user environment 101 at a particular point in time is backed up to the operating environment 107 of the environment storage area 102 at the occurrence of an event, such as the expiration of an interval timer at the particular point in time. The interval timer may comprise an amount of time which passes before a buffer of change data from the user environment 100 is backed up to the operating environment 107 of the environment storage area 102. Also illustrated are the explicit updates 402B and implicit updates 403B that may occur and may be authorized to be implemented by an end user. Vendor-driven changes (or vendor initiated changes) 404B are changes authorized by an end user that affect all end users of a given modifiable digital device entity. Vendor-driven changes 404B may include, but are not limited to, service packs and/or driver updates. User-driven changes (or user initiated changes) 405B are changed by end users that occur within the end user's operating space. User-driven changes 405B may include, but are not limited to, a change to a Microsoft Word file, a modification to a registry entry, and/or updating a script file.

[0028] The elements that comprise the user environment 101 may be defined. FIG. 2 illustrates the definition of the elements that comprise the user environment 101 by an end user via a user interface. As illustrated, the end user may define which internal and external elements (including one or more computers, networks, handheld devices, add-on devices (a modifiable digital device entity not present in the user environment 101 previously), printers, imagers, or other devices) comprise the user environment 101. The user interface may be presented to the end user via an output device (including, but not limited to a cathode ray tube display, a liquid crystal display, a

telephone, and/or a printer) and the end user may enter input via an input device (including, but not limited to, a keyboard, a mouse, a track pad, a trackball, a scanner, a bar code reader, a telephone, and/or a light pen). By defining the elements that comprise the user environment 101, the elements which are backed up and/or restored are determined.

[0029] Changes to the user environment 101 may be classified as changes to one or more elements of the user environment 101. Changes to one or more elements of the user environment 101 may include changes to one or more modifiable digital device entities of the user environment 101 or one or more changes to a division of one or more modifiable digital device entities. For example, a hard drive may have multiple divisions in data stored in the hard drive including, but not limited to, operating systems, application programs, and/or end user data. These changes may be further classified as internal or external. Data may be uploaded by a vendor to the vendor repository 108 of the environment storage area 102. However, the various logical entities in the operating environment 107 of the environment storage area 102 for the user environment 101 and/or the user environment 101 may not change as a result. Change rules may be examined before the user environment 101 is recorded in a logical entity stored in the operating environment 107 of the environment storage area 102 or before changes are applied to logical entity stored in the operating environment 107 of the environment storage area 102 or the user environment 101. These change rules may determine what data is authorized to be changed in the user environment 101 or a logical entity stored in the operating environment 107 of the environment storage area 102. The change rules may have different cases for when changes are local to the user environment 101 or remote. As illustrated in FIG. 6, changes by an end user to the user environment 101 may be implicitly authorized. However,

changes by a vendor may require explicit authorization. An end user may have to give specific authorization to apply changes from a vendor.

[0030] FIG. 7 is a flow chart 700 illustrating a process in the user environment 101 for storing changes for the user environment 101 to the operating environment 107 of the environment storage area 102. At 701, an end user may log in to the user environment 101. At 702, if there are changes to be applied to the user environment 101 (if the user environment 101 is to be restored from one or more logical entities stored in the operating environment 107 of the environment storage area 102), the changes may be applied to the user environment 101. At 703, an interval timer may be reduced. At 704, it may be determined whether the interval timer has expired. If the interval timer has not expired, 705, the changes to the user environment 101 may be stored and it the interval timer may be again reduced, 703. If the interval timer has expired, 706, it may be determined whether changes have occurred to the user environment 101. If changes have occurred, 707, the changes may be categorized and classified into a logical entity and transferred to the operating environment 107 of the environment storage area 102 and the interval timer may be reset, 708. The interval timer may then again reduced, 703. If changed have not occurred, 709, it may be determined whether the end user is logged in. If the end user is not logged in, 710, the process may end. If the end user is logged in, 711, it may be determined whether the user environment 101 is being shut down. If the user environment 101 is being shut down, 712, the process may end. If the user environment 101 is not being shut down, 705, changes to the user environment 101 may be stored and it the interval timer may again be reduced, 703.

[0031] FIG. 8 is a flow chart 800 illustrating a process in the vendor repository 108 of the environment storage area 102 for storing vendor updates to the

vendor repository 108 of the environment storage area 102. When the process awakens from a quiescent state, 801, it may be determined whether a vendor has an update. If the vendor does not have an update, 802 the process may enter a quiescent state. If the vendor has an update, 803, if there are pending changes, the pending changes may be applied. At 804, an interval timer may be reduced. If the interval has not expired, 805, the process may enter a quiescent state, 802 and the interval timer may again be reduced 804. If the interval has expired, 806, it may be determined whether a vendor is logged in. If a vendor is not logged in, the process may enter a quiescent state, 802, and the interval timer may again be reduced 804. If a vendor is logged in, 807, it may be determined whether changes have been made. If changes have not occurred, the process may enter a quiescent state, 802, and the interval timer may again be reduced 804. If changes have occurred, 808, the vendor repository 108 may be accessed, the vendor updates may be time stamped and applied, and the interval timer may be reset, 809. Then, 804, the interval timer may again be reduced.

[0032] FIG. 9 illustrates examples of events which may trigger the recordation of changed elements of the user environment 101 in the operating environment 107 of the environment storage area 102. As illustrated, events may include, but are not limited to, the installation of an operating system, a change to a spreadsheet, a driver upgrade, a change to a router (an example of an external change), a BIOS change (an example of an internal change), an installation (including, but not limited to operating system and/or application program), an upgrade(including, but not limited to operating system and/or application program), a bug fix (including, but not limited to operating system and/or application program), an application install, and/or the application of a service pack. Also, software may be purchased by an end user from a vendor and the vendor may upload the software to the

vendor repository 108 of the environment storage area 102. Upon a subsequent login, interval expiration, and/or other event, the newly purchased application may be installed in the user environment 101. The events may trigger the recordation of changed elements of the user environment 101 in the repository according to a schedule. For example, the occurrence of an event may only trigger recordation after the expiration of a timer. The schedule may include, but is not limited to, the expiration of a timer, a login and/or logoff, and/or a set of scheduling parameters. Change rules (or change analytics) may be examined before changes are applied. The operating environment 107 of the environment storage area 102 may include a remote authorization shield based on the change rules which may control whether or not a change is applied to a logical entity for the user environment 101 stored in the operating environment 107 of the environment storage area 102. For example, an end user may configure change rules such that the remote authorization shield prevents the newest software patches uploaded to the vendor repository 108 of the environment storage area 102 from being applied to the user environment 101 and/or the logical entities for the user environment 101 stored in the operating environment 107 of the environment storage area 102. The remote authorization shield may be configurable to prevent logical entities for the user environment 101 from being stored in the operating environment 107 of the environment storage area 102. The user environment 101 may include a local authorization shield based on the change rules which may control whether or not elements of the user environment 101 are recorded in a logical entity which is transferred to the operating environment 107 of the environment storage area 102 and/or whether elements of the user environment 101 are restored from a logical entity transferred from the operating environment 107 of the environment storage area 102.

[0033] As illustrated in FIG. 10, the environment storage area 102 may include dynamic storage space. The environment storage area 102 may include two or more storage areas and may expand from a first storage area to one or more other storage areas based on storage limitations or imposed limits.

[0034] FIG. 11 illustrates the relationship among interfaces for controlling system 100. Various screens, interfaces, programs, scripts, databases, logic entities, variables, and/or other programming device and/or instrument may control all aspects of activity of system 100 including, but not limited to, interval expiration, the coding of system 100 in computer readable instructions (which may be stored in a tangible medium), processing, report generation, logical separation of user environment 101 (local) and/or environment storage area 102 (remote) functions, and/or other end user administration and/or system administration features.

[0035] The one or more logical entities for the user environment 101 may comprise a stream, a database, a flat file, and/or other type of file organization. The one or more logical entities for the user environment 101 may be organized by a defined structure for the location of elements of user environment 101 in the one or more logical entities (as illustrated in FIG. 4). FIG. 12 illustrates an example section 1200 of a flat file logical entity subsequent to the first logical entity for the user environment 101. The section 1200 (which may include, but is not limited to, an operating system section, an application program section, a data section, a router section, a BIOS section, and/or a firmware section) may include control data 1201 and section data 1202. The control data 1202 may include a section identifier 1203 and an offset 1204. The section identifier 1203 may include an internal section identifier and an external section identifier. The section identifier 1203

may correspond to entries in a device correlation table. The offset 1202 may include a beginning and an end of a section offset. The beginning and end of the section offset may be expressed in bits. The offset 1204 may correlate to a portion of a section of a previously recorded logical entity which is to be changed. The section 1200 may include a type of section and the changed data. The changed data may include, but is not limited to, added data, changed data, and/or deleted data.

[0036] Redundant data may be stored in the environment storage area 102. The redundant data may relate to one or more logical entities stored in the operating environment 107 of the environment storage area 102 for the user environment 101, one or more logical entities stored in the operating environment 107 of the environment storage area 102 for one or more other user environments, or one or more logical entities stored in the operating environment 107 of the environment storage area 102 for the user environment 101 and one or more logical entities stored in the operating environment 107 of the environment storage area 102 for one or more other user environments. Redundant data may be reduced in the environment storage area 102 by storing a single copy of common data and utilizing one or more associations to the single copy of the common data rather than storing multiple copies of the common data. FIG. 14 illustrates an example of a storage file 1400 for the repository 102. As illustrated, the storage file 1400 may comprise a static data column 1401 and a dynamic data column 1402. The static data column 1401 may include one or more associations 1403 to static data. The dynamic data column 1402 may include one or more associations 1404 to dynamic data. The storage file 1400 may be arranged in a tandem sequence where a static data association 1403 may be located adjacent in the storage file 1400 to a dynamic data association 1404 for the same time. In this fashion, large portions of data may be reduced to a single

copy, referenced by a single link. As illustrated, the associations comprise World Wide Web uniform resource locators. However, it should be understood that the associations may comprise any kind of associations without departing from the scope of the present disclosure.

[0037] FIG. 15 illustrates a process of storage in the operating environment 107 of the environment storage area 102. Rather than actual data being stored in the operating environment 107 of the environment storage area 102, the operating environment 107 of the environment storage area 102 may include associations to an area of the environment storage area 102. The association stored in the operating environment 107 of the environment storage area 102 may be time stamped to preserve system 100 integrity. Identical associations stored in the operating environment 107 of the environment storage area 102 may be compressed to avoid unnecessary redundancy. This may preserve ownership, security, and integrity of the change data for a particular modifiable digital device entity by using an association back to an area of the environment storage area 102 so that a user who owns the change data for the particular modifiable digital device entity retains control over the data rather than storing it in the in the operating environment 107 of the environment storage area 102. This also may reduce storage requirements for the operating environment 107 of the environment storage area 102 and contribute to data centrality.

[0038] FIG. 16 illustrates a process of storage in the vendor repository 107 of the environment storage area 102. Rather than actual data being stored in the vendor repository 108 of the environment storage area 102, the vendor repository 108 of the environment storage area 102 may include associations to a vendor system. Thus, the vendor 106 may upload data to the vendor repository 108 of the environment storage area 102 merely by changing the

data on the vendor's system where the association points. The association stored in the vendor repository 108 of the environment storage area 102 may be time stamped to preserve system 100 integrity. Identical associations stored in the vendor repository 108 of the environment storage area 102 may be compressed to avoid unnecessary redundancy. This may preserve ownership, security, and integrity of the vendor data by using an association back to the vendor's system so that the vendor retains control over the data rather than storing it in the in the vendor repository 108 of the environment storage area 102. This also may reduce storage requirements for the vendor repository 108 of the environment storage area 102 and contribute to data centrality.

[0039] FIG. 17 illustrates a system 1500b for backup up a user environment for at least one modifiable digital device entity 1501. As illustrated in 1500a, the modifiable digital device entity 1501 may comprise any kind of modifiable digital device entity which includes encoded data that may be replicated, such as a mobile device, a desktop device and/or another kind of computing device. The user environment for the at least one modifiable digital device entity 1501 may be periodically backed up utilizing backup method 1502 (which may comprise a variety of backup methods) which may identify, tag, and encode 1503, at a bit level (including the exact location of the data on the at least one modifiable digital device entity 1501 and time data), the user environment for the at least one modifiable digital device entity 1501 and store the user environment for the at least one modifiable digital device entity1501 in a environment storage area 1504. The stored user environment for the at least one modifiable digital device entity 1501 may comprise an original state of the user environment for the at least one modifiable digital device entity 1501 at an original time along with the subsequent recorded changes to the user environment for the at least one modifiable digital device

entity 1501 at subsequent times. The environment storage area 1504 may provide an acknowledgement to the user environment for the at least one modifiable digital device entity 1501 that the backup occurred successfully. The system 1500b may cycle through stages of evolution where the at least one modifiable digital device entity 1501 is turned on and experiences a user-based change and/or a vendor-based change, backup method 1502 is instantiated, change data is encoded, the environment storage area 1504 is built up with the change data for each evolution of time, and the backup of the change is acknowledged.

[0040] FIG. 18 illustrates a method 1800 of automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. In step 1801, classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 1802, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 1803, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area.

[0041] FIG. 19 illustrates a method 1900 of automated periodic centralized backup of user environments, in accordance with an alternative embodiment of the present disclosure. In step 1901, classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 1902, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 1903, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area. In step 1904, transfer at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time from the central environmental storage area to the user environment. Transferring at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time from the central environmental storage area to the user environment may comprise securely transferring at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the

first time and the second logical entity for the second time from the central environmental storage area to the user environment.

[0042] FIG. 20 illustrates a method 2000 of automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. In step 2001, classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 2002, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 2003, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area. In step 2004, restore the user environment at a third time from at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time transferred from the central environment storage area. The third time may comprise a login time for the user environment.

[0043] FIG. 21 illustrates a method 2100 of automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. In step 2101, classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 2102, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 2103, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area. In step 2104, receive an update from a vendor. Receiving an update from a vendor may comprise securely receiving an update from a vendor. In step 2105, update at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update. Updating update at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update may comprise receiving an authorization from a user of the user environment to update at least one of the first logical entity for the first time, a second logical entity for a second

time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update.

[0044] FIG. 22 illustrates a method 2200 of automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. In step 2201, classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 2202, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 2203, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area. In step 2204, determine a second set of elements of the user environment at a second time which have changed from the first time. In step 2205, combine the second set of elements into a second logical entity for the second time associated with the first logical entity for the first time. Combining the second set of elements into a second logical entity for the second time associated with the first logical entity for the first time may comprise encoding the second logical entity for the second time with offset data correlating the second set of elements to their location in the

user environment. In step 2206, transfer the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area. Transferring the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area may comprise securely transferring the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area.

[0045] FIG. 23 illustrates a method 2300 of automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. In step 2301, define a user environment for at least one computing device. In step 2302, classify a first set of elements of the user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 2303, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 2304, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area.

[0046] FIG. 24 illustrates a method 2400 of automated periodic centralized backup of user environments, in accordance with an embodiment of the present disclosure. In step 2401, classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices. The first time may comprise at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment. The user environment may comprise a group of user environments. In step 2402, combine the first set of elements at the first time into a first logical entity for the first time. Combining the first set of elements at the first time into a first logical entity for the first time may comprise combining the first set of elements at the first time into a first logical entity for the first time into a flat file. In step 2403, transfer the first logical entity for the first time to a central environmental storage area. Transferring the first logical entity for the first time to a central environmental storage area may comprise securely transferring the first logical entity for the first time to a central environmental storage area. In step 2204, reduce redundant data in the central environment storage area by utilizing a single copy of common data and at least one association to the single copy of the common data rather than multiple copies of the common data.

[0047] In the present disclosure, the methods disclosed may be implemented as sets of instructions or software readable by a device. Further, it is understood that the specific order or hierarchy of steps in the methods disclosed are examples of exemplary approaches. Based upon design preferences, it is understood that the specific order or hierarchy of steps in the method can be rearranged while remaining within the disclosed subject

matter. The accompanying method claims present elements of the various steps in a sample order, and are not necessarily meant to be limited to the specific order or hierarchy presented.

[0048] It is believed that the present disclosure and many of its attendant advantages will be understood by the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the components without departing from the disclosed subject matter or without sacrificing all of its material advantages. The form described is merely explanatory, and it is the intention of the following claims to encompass and include such changes.

CLAIMS

What is claimed is:

1. A method, comprising:

classifying a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices;

combining the first set of elements at the first time into a first logical entity for the first time; and

transferring the first logical entity for the first time to a central environmental storage area.

2. The method of claim 1, further comprising:

transferring at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time from the central environmental storage area to the user environment.

3. The method of claim 2, wherein transferring at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time from the central environmental storage area to the user environment comprises:

securely transferring at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical

entity for the first time and the second logical entity for the second time from the central environmental storage area to the user environment.

4. The method of claim 1, further comprising:

restoring the user environment at a third time from at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time transferred from the central environment storage area.

5. The method of claim 4, wherein the third time comprises a login time for the user environment.

6. The method of claim 1, wherein the first time comprises at least one of an initial operating time for the user environment, a logoff time for the user environment, or an expiration of an interval timer for the user environment.

7. The method of claim 1, wherein the user environment comprises a group of user environments.

8. The method of claim 1, further comprising:

receiving an update from a vendor; and

updating at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update.

9. The method of claim 8, wherein updating at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update comprises:

receiving an authorization from a user of the user environment to update at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update.

10. The method of claim 8, wherein receiving an update from a vendor comprises:

securely receiving an update from a vendor.

11. The method of claim 1, further comprising:

determining a second set of elements of the user environment at a second time which have changed from the first time;

combining the second set of elements into a second logical entity for the second time associated with the first logical entity for the first time; and

transferring the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area.

12. The method of claim 11, wherein combining the second set of elements into a second logical entity for the second time associated with the first logical entity for the first time comprises:

encoding the second logical entity for the second time with offset data correlating the second set of elements to their location in the user environment.

13. The method of claim 11, wherein transferring the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area comprises:

securely transferring the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area.

14. The method of claim 1, further comprising:

defining the user environment.

15. The method of claim 1, further comprising:

reducing redundant data in the central environment storage area by utilizing a single copy of common data and at least one association to the single copy of the common data rather than multiple copies of the common data.

16. The method of claim 1, wherein transferring the first logical entity for the first time to a central environmental storage area comprises:

securely transferring the first logical entity for the first time to a central environmental storage area.

17. The method of claim 1, wherein combining the first set of elements at the first time into a first logical entity for the first time comprises:

combining the first set of elements at the first time into a first logical entity for the first time into a flat file.

18. A system, comprising:

a user environment including at least two coupled modifiable digital device entities with a dependency relationship; and

a central environment storage area, communicatively coupled to the user environment,

wherein the user environment classifies a first set of elements of the user environment at a first time, the first set of elements includes at least one element from each of the at least two coupled modifiable digital device entities, the user environment combines the first set of elements into a first logical entity for the first time, and the user environment transfers the first logical entity for the first time to the central environment storage area for storage.

19. The system of claim 18, wherein the user environment receives one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time from the central environment storage area at a third time and restores the user environment utilizing the one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time.

20. A set of computer readable instructions, embodied in a tangible medium, which when executed perform a method comprising:

classifying a first set of elements of an user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices;

combining the first set of elements at the first time into a first logical entity for the first time; and

transferring the first logical entity for the first time to a central environmental storage area.

CLF0712

AUTOMATED PERIODIC CENTRALIZED BACKUP OF USER ENVIRONMENTS

ABSTRACT

[0049] The elements of a user environment are classified and combined into a logical entity and then backed up to a central environment storage area. The user environment is monitored during utilization and the central environment storage area is read from and/or written to upon the occurrence of a triggering event. The user environment is restored utilizing one or more logical entities stored in the central environment storage area. The central environment storage area provides a means to organize and backup information such that data may be more efficiently managed, saving valuable storage space. Centralization enables vendors to access a vendor repository of the central environment storage area, specific to their product, and upload product related. End users then are able to authorize the application of the vendor uploaded data to the operating environment of the central environment storage area and/or the user environment.

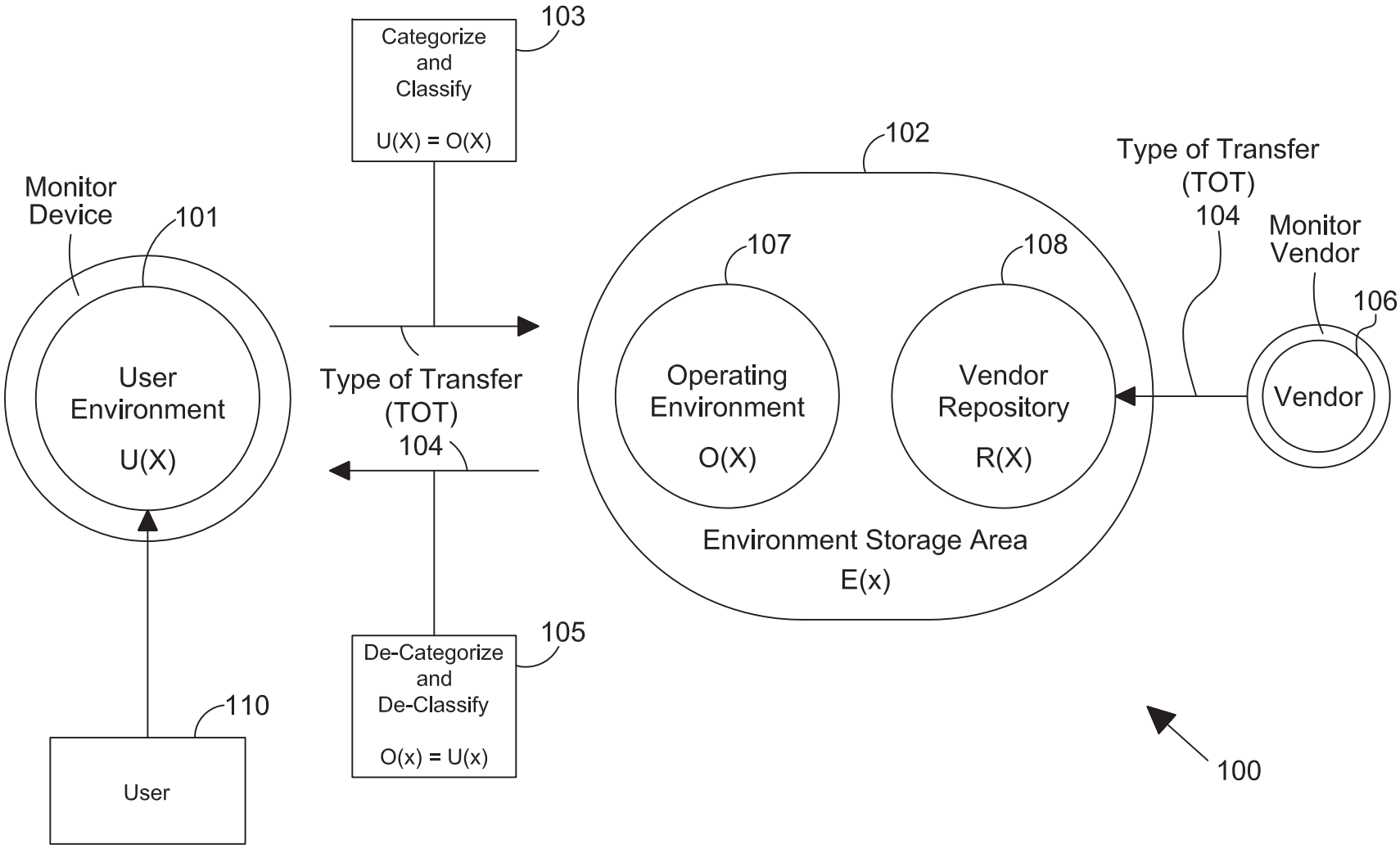
Monitor Device
101
User Environment
U(X)
User
110
Categorize and Classify
U(X) = O(X)
103
Type of Transfer (TOT)
104
De-Categorize and De-Classify
O(x) = U(x)
105
102
107
Operating Environment
O(X)
108
Vendor Repository
R(X)
Environment Storage Area
E(x)
Type of Transfer (TOT)
104
Monitor Vendor
106
Vendor
100

FIG. 1A

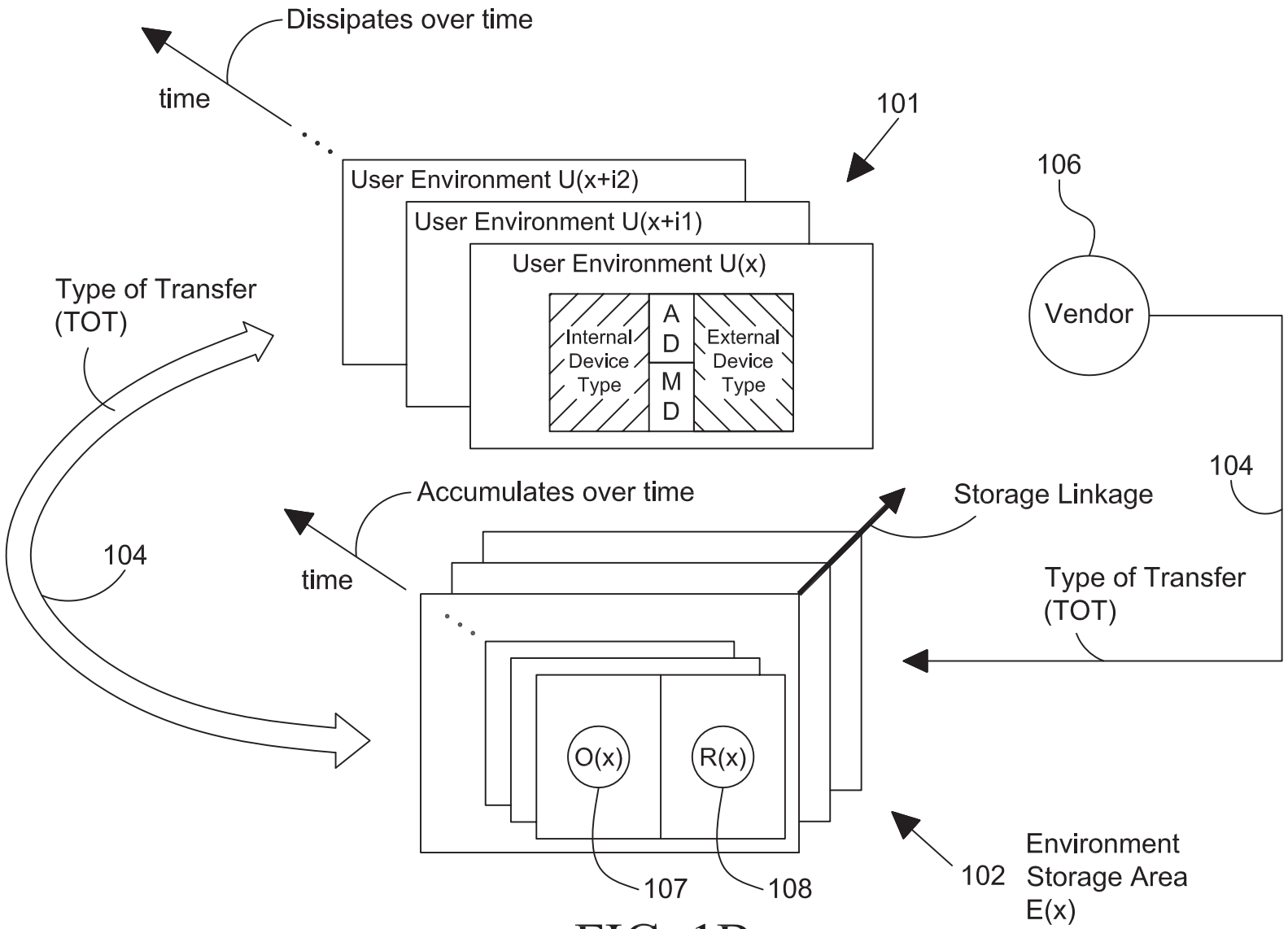
Dissipates over time
time
101
User Environment U(x+i2)
User Environment U(x+i1)
User Environment U(x)
Internal Device Type
A D
M D
External Device Type
106
Vendor
Type of Transfer (TOT)
104
Accumulates over time
time
Storage Linkage
104
Type of Transfer (TOT)
O(x)
R(x)
107
108
102
Environment Storage Area E(x)

FIG. 1B

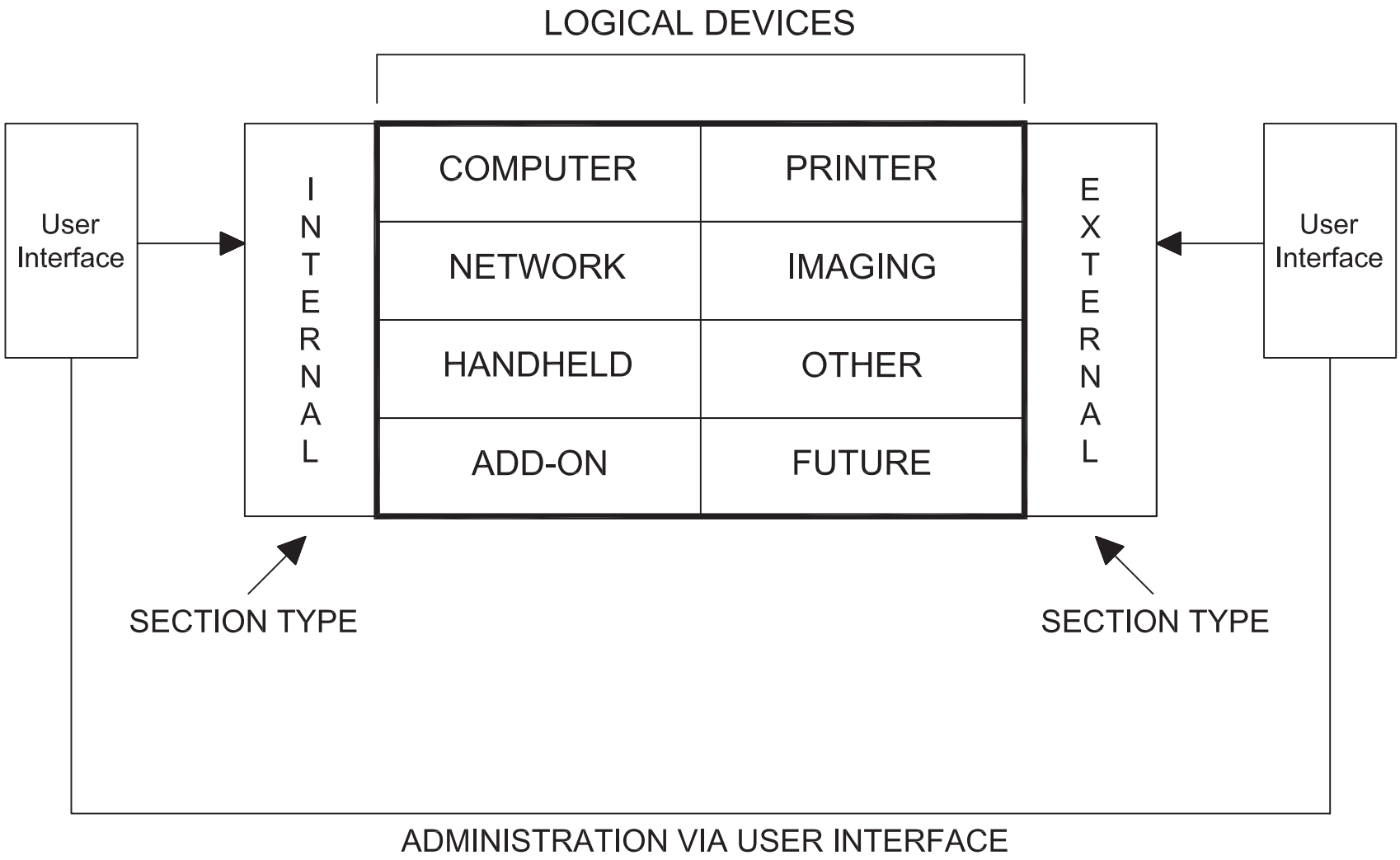
LOGICAL DEVICES
User Interface
INTERNAL
COMPUTER
PRINTER
NETWORK
IMAGING
HANDHELD
OTHER
ADD-ON
FUTURE
EXTERNAL
User Interface
SECTION TYPE
SECTION TYPE
ADMINISTRATION VIA USER INTERFACE

FIG. 2

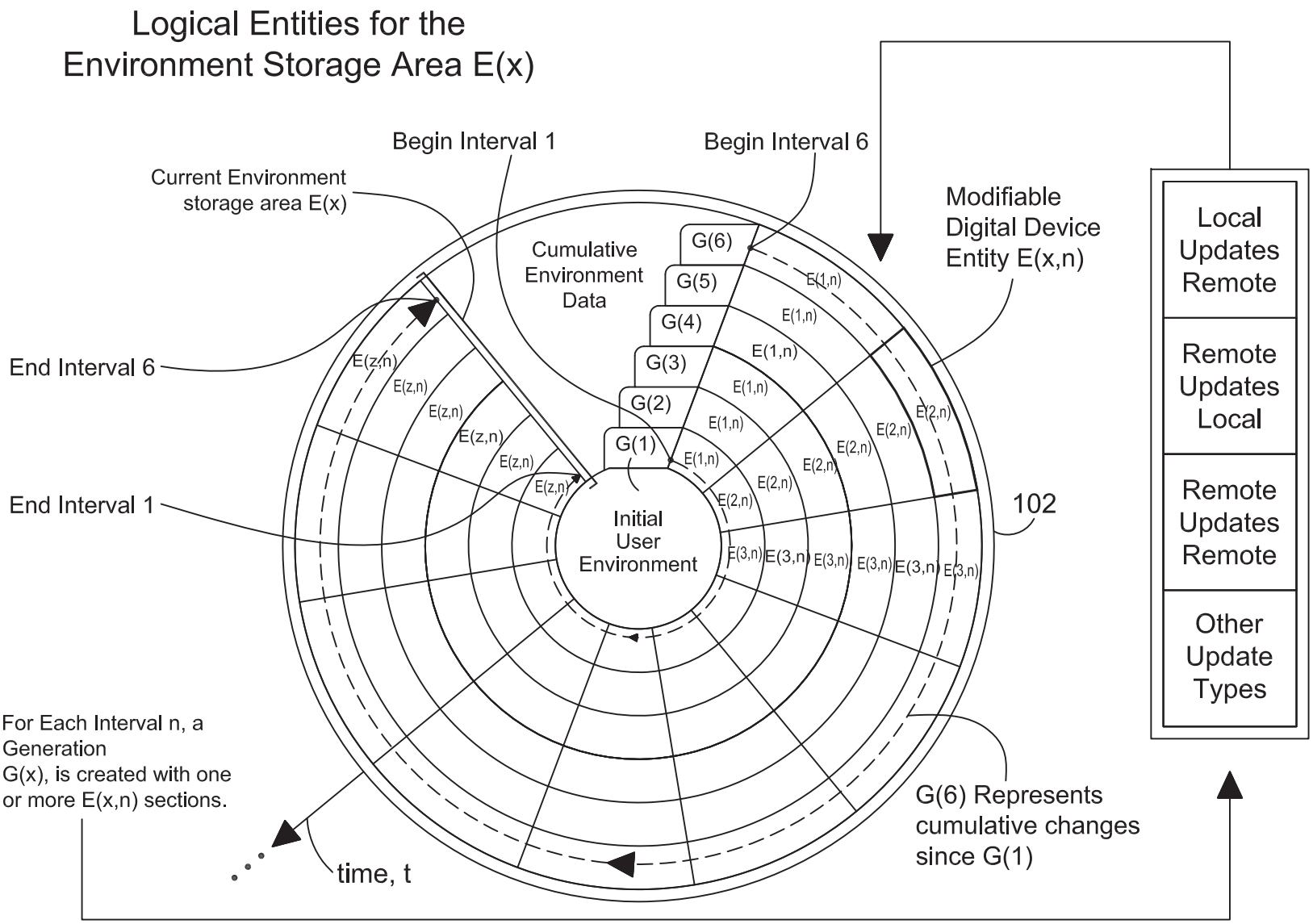
Logical Entities for the
Environment Storage Area E(x)
Begin Interval 1
Begin Interval 6
Current Environment
storage area E(x)
Modifiable
Digital Device
Entity E(x,n)
Cumulative
Environment
Data
G(6)
G(5)
G(4)
G(3)
G(2)
G(1)
E(1,n)
E(2,n)
E(3,n)
E(z,n)
End Interval 6
End Interval 1
Initial
User
Environment
102
Local
Updates
Remote
Remote
Updates
Local
Remote
Updates
Remote
Other
Update
Types
For Each Interval n, a
Generation
G(x), is created with one
or more E(x,n) sections.
time, t
G(6) Represents
cumulative changes
since G(1)

FIG. 3

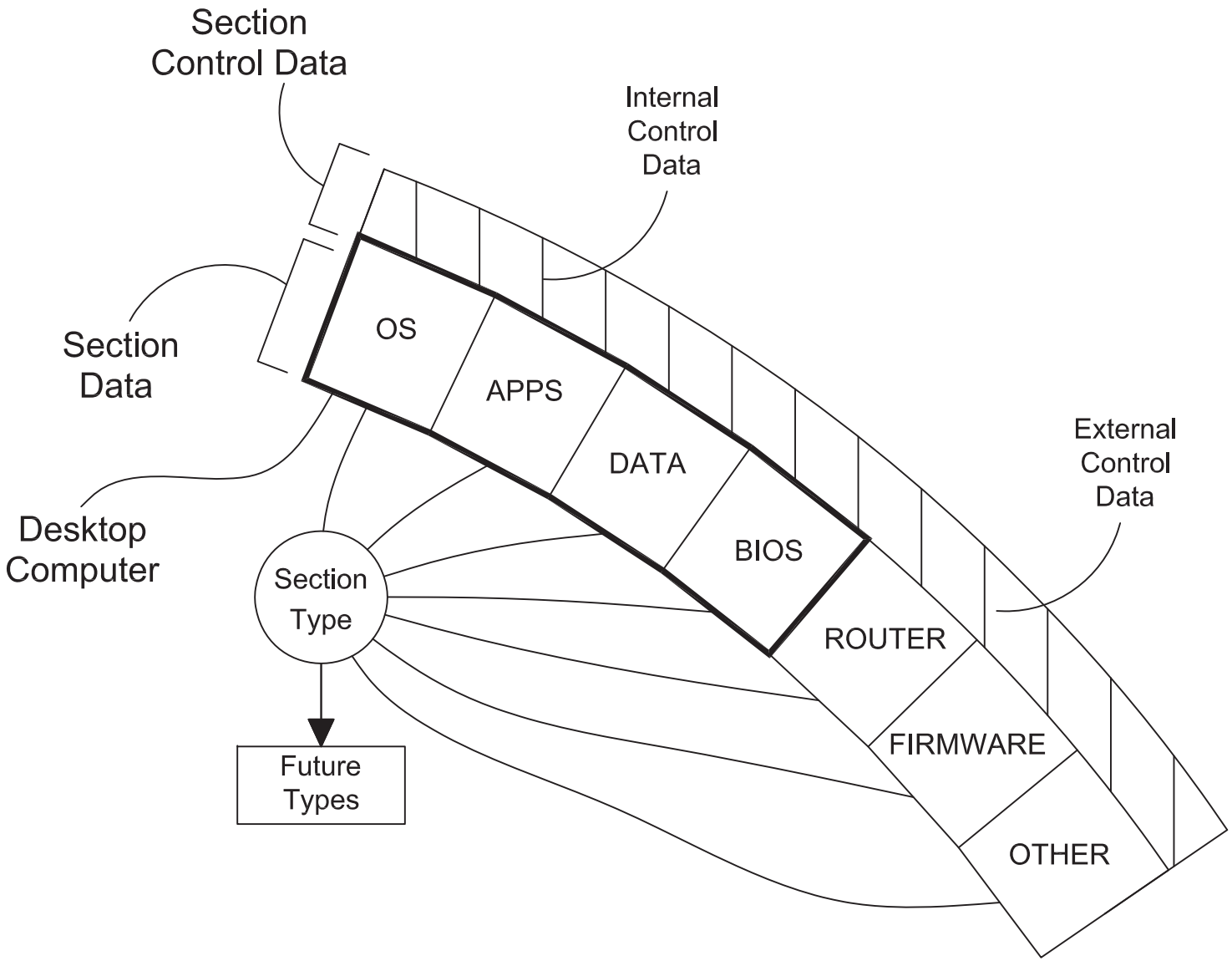
Section
Control Data
Internal
Control
Data
Section
Data
Desktop
Computer
OS
APPS
DATA
BIOS
External
Control
Data
Section
Type
ROUTER
FIRMWARE
OTHER
Future
Types

FIG. 4

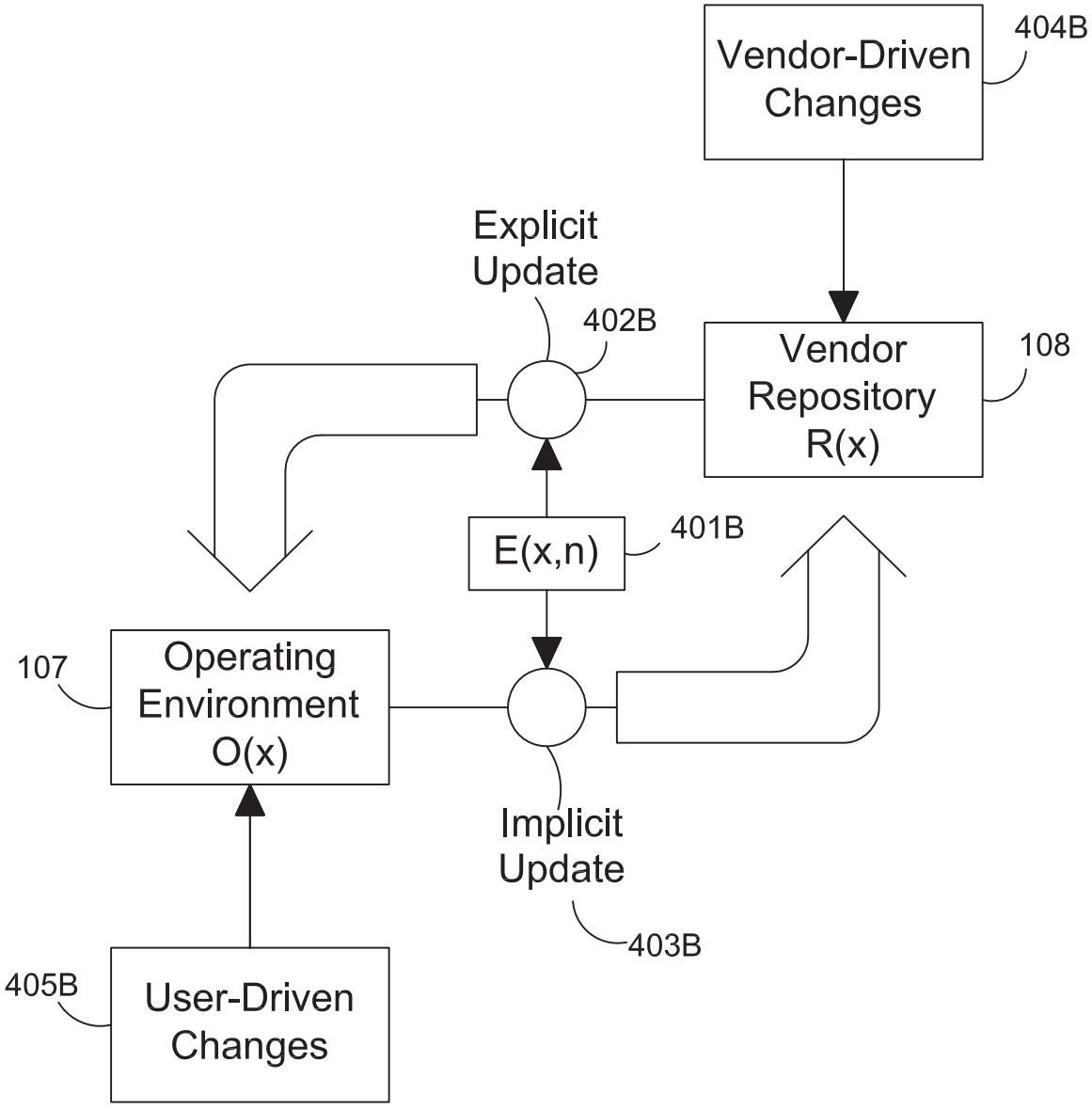
Vendor-Driven Changes
404B
Explicit Update
402B
Vendor Repository R(x)
108
E(x,n)
401B
107
Operating Environment O(x)
Implicit Update
403B
405B
User-Driven Changes

FIG. 5

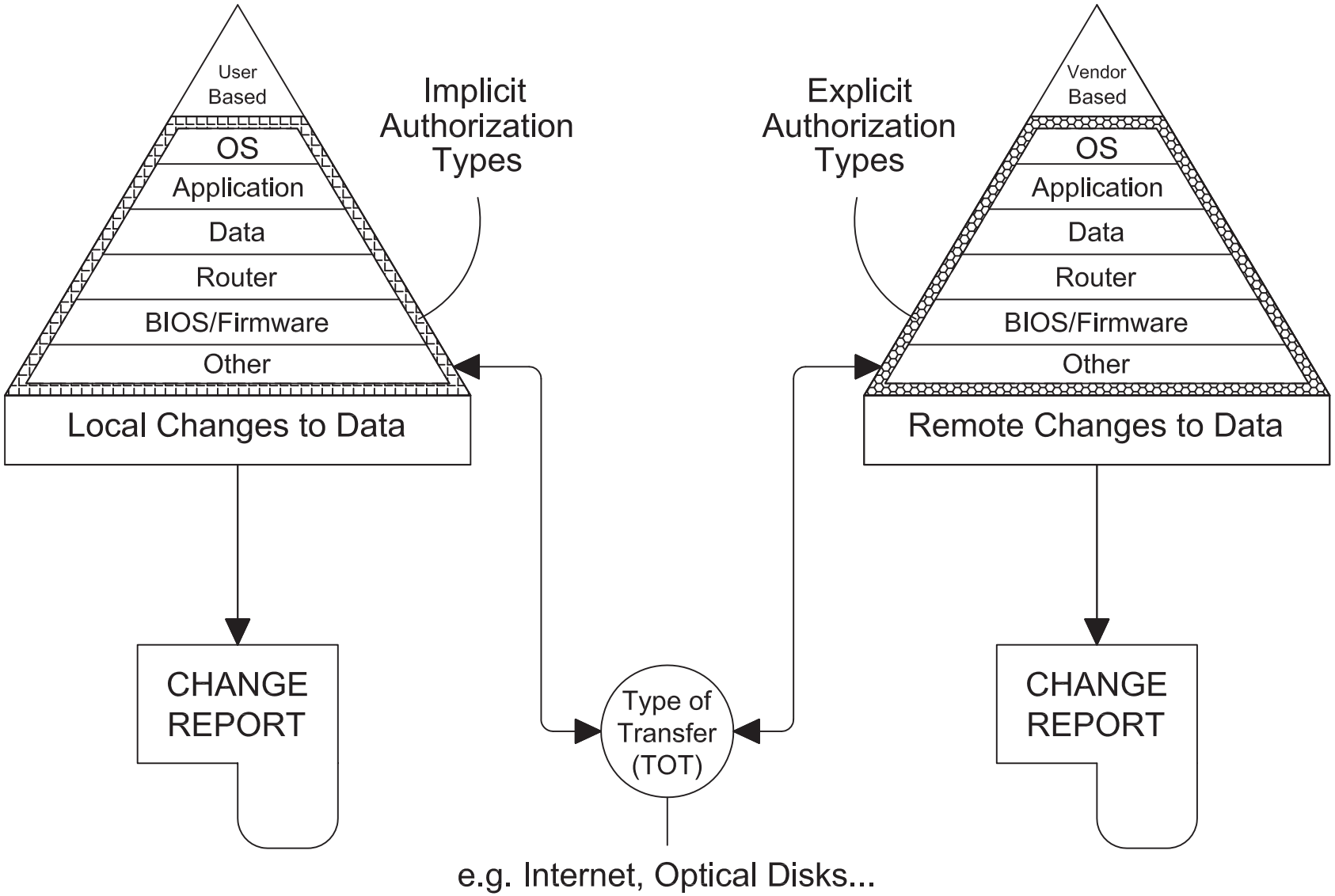
User Based
OS
Application
Data
Router
BIOS/Firmware
Other
Local Changes to Data
Implicit Authorization Types
Explicit Authorization Types
Vendor Based
OS
Application
Data
Router
BIOS/Firmware
Other
Remote Changes to Data
CHANGE REPORT
Type of Transfer (TOT)
CHANGE REPORT
e.g. Internet, Optical Disks...

FIG. 6

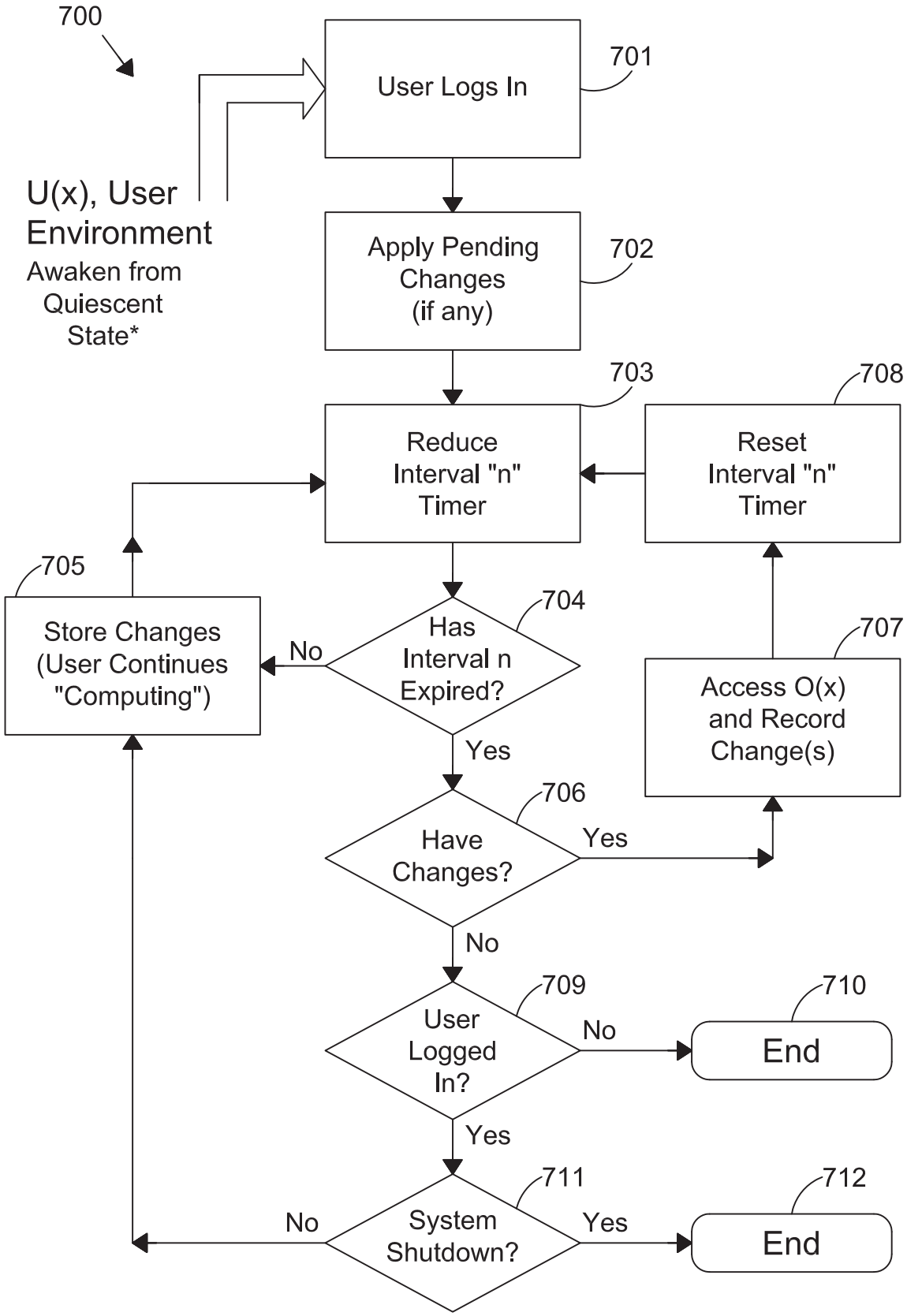
700
User Logs In
701
U(x), User Environment
Awaken from Quiescent State*
Apply Pending Changes (if any)
702
703
708
Reduce Interval "n" Timer
Reset Interval "n" Timer
705
Store Changes (User Continues "Computing")
704
Has Interval n Expired?
No
Yes
707
Access O(x) and Record Change(s)
706
Have Changes?
Yes
No
709
User Logged In?
No
710
End
Yes
711
System Shutdown?
No
Yes
712
End

FIG. 7

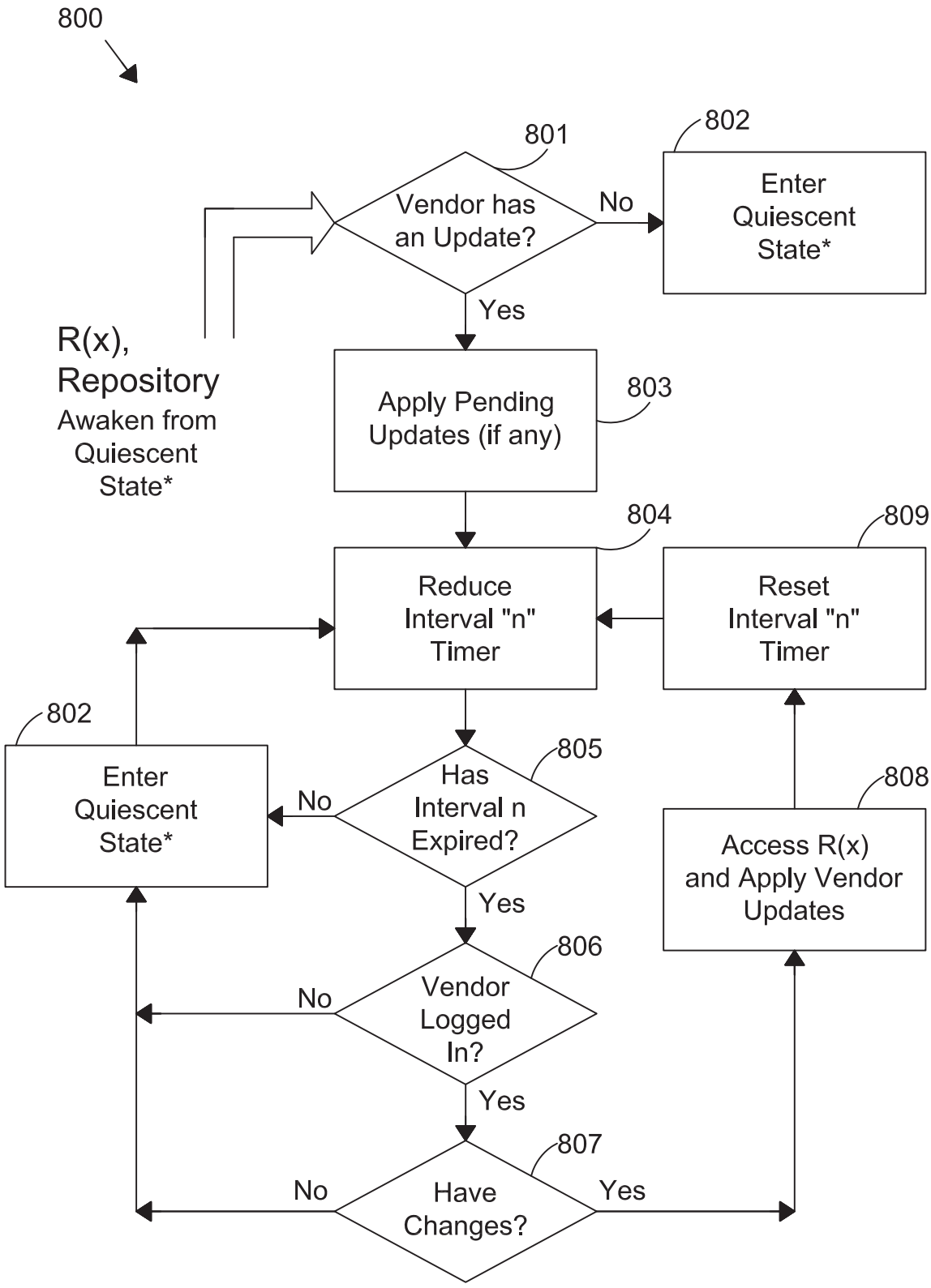
800
801
Vendor has an Update?
No
802
Enter Quiescent State*
Yes
R(x), Repository
Awaken from Quiescent State*
Apply Pending Updates (if any)
803
804
Reduce Interval "n" Timer
809
Reset Interval "n" Timer
802
Enter Quiescent State*
805
Has Interval n Expired?
No
808
Access R(x) and Apply Vendor Updates
Yes
806
Vendor Logged In?
No
Yes
807
Have Changes?
No
Yes

FIG. 8

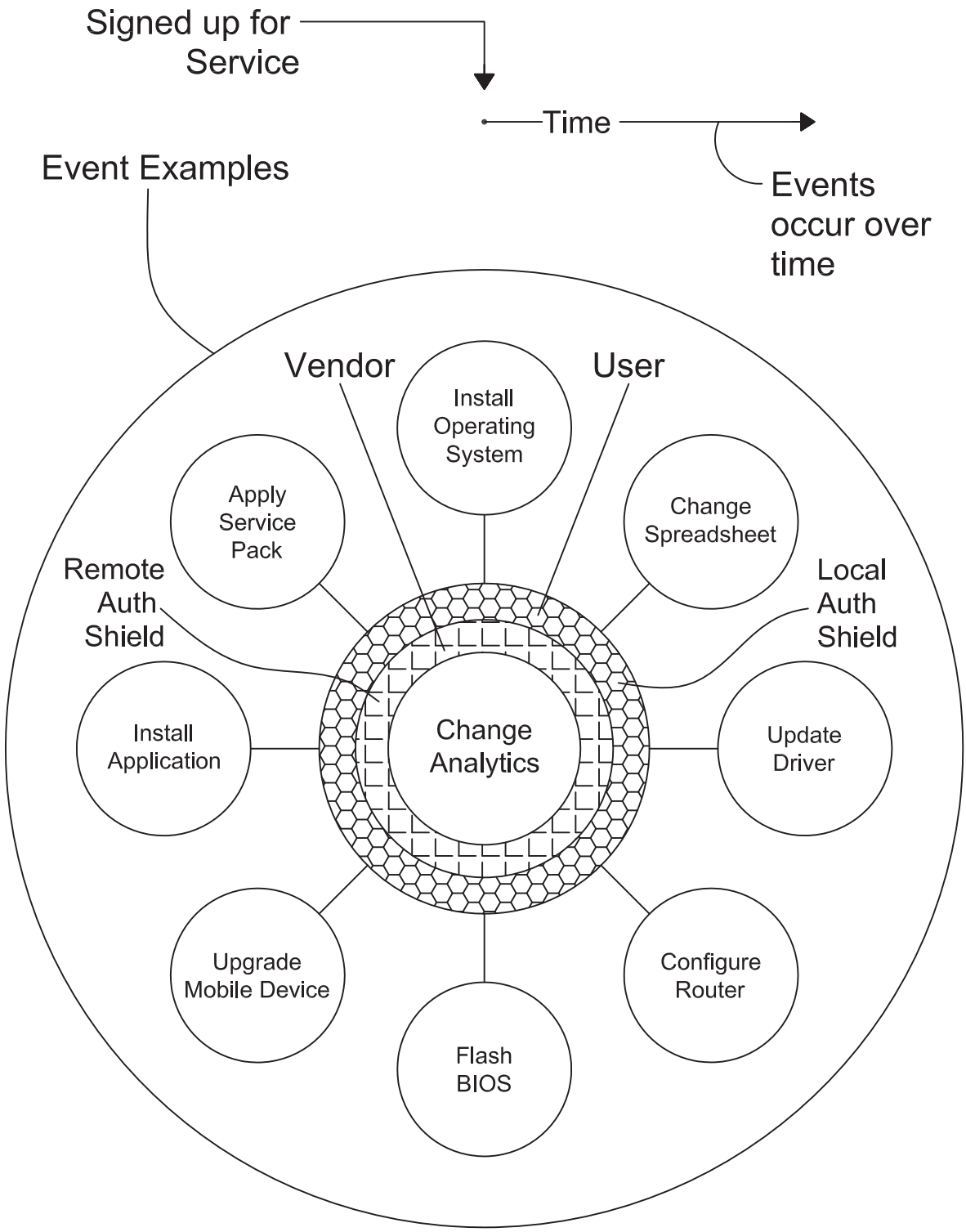
Signed up for Service
Time
Events occur over time
Event Examples
Vendor
User
Install Operating System
Apply Service Pack
Change Spreadsheet
Remote Auth Shield
Local Auth Shield
Install Application
Change Analytics
Update Driver
Upgrade Mobile Device
Configure Router
Flash BIOS

FIG. 9

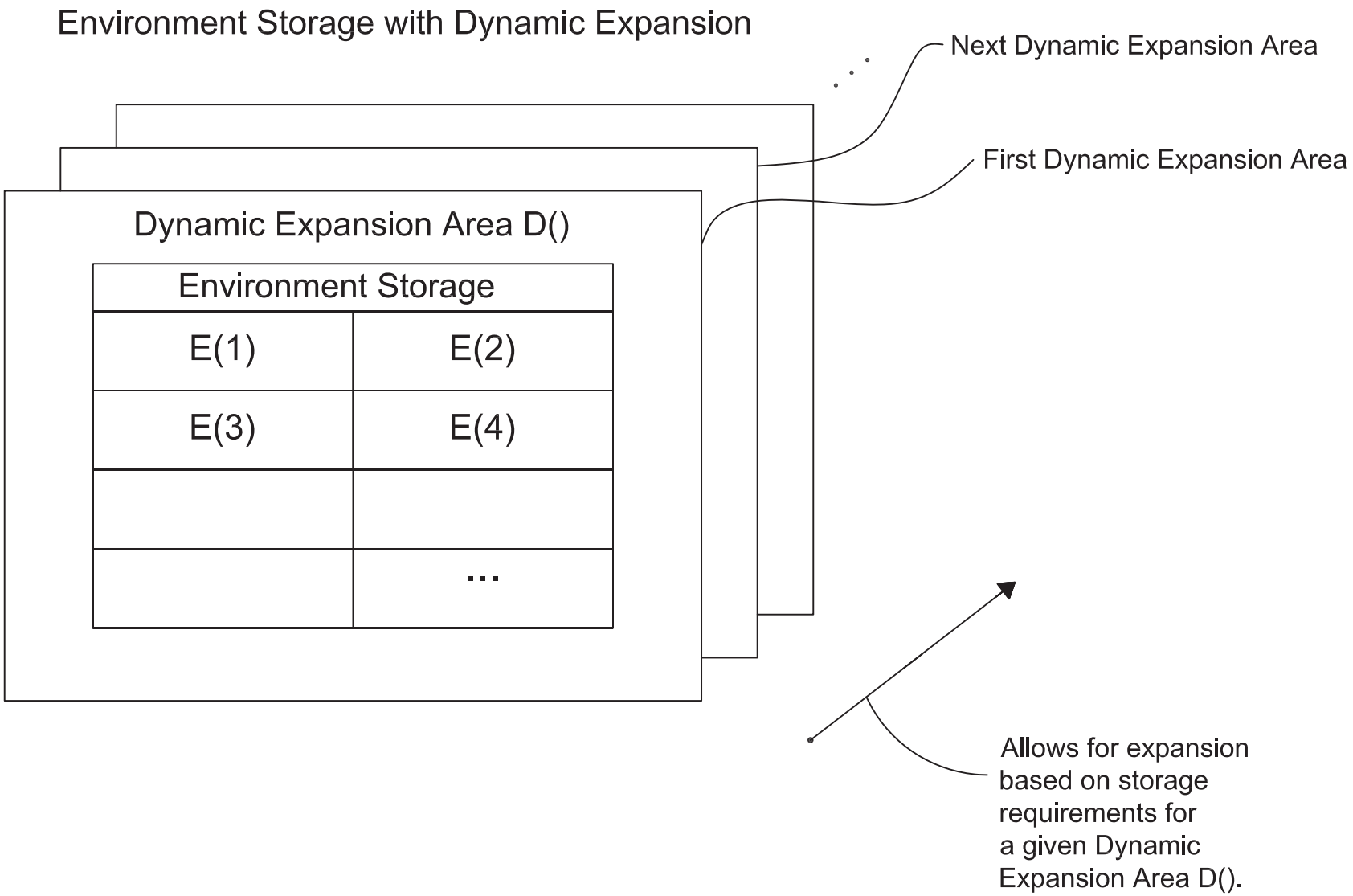
Environment Storage with Dynamic Expansion
Next Dynamic Expansion Area
First Dynamic Expansion Area
Dynamic Expansion Area D()
Environment Storage
E(1)
E(2)
E(3)
E(4)
...
Allows for expansion based on storage requirements for a given Dynamic Expansion Area D().

FIG. 10

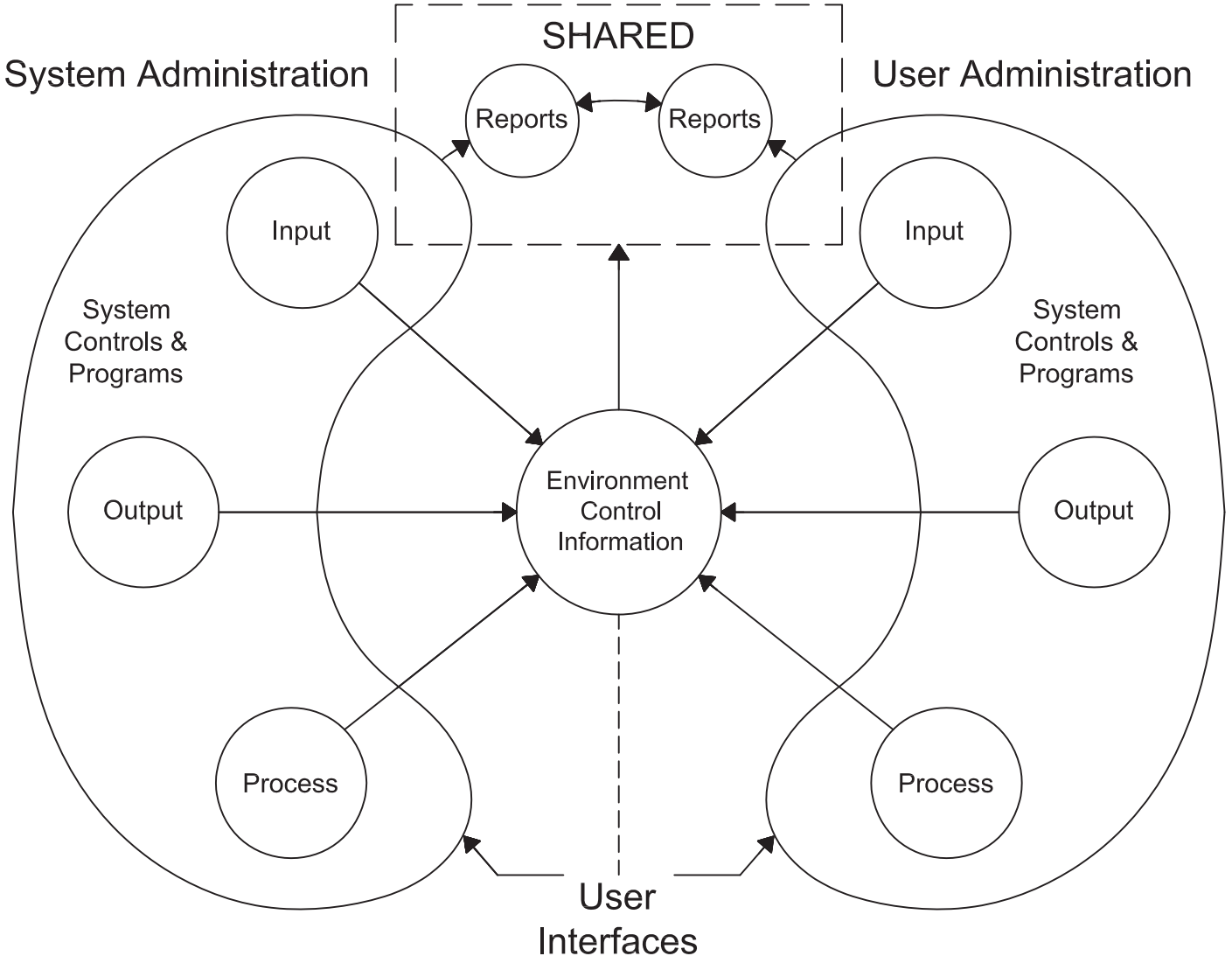
SHARED
System Administration
User Administration
Reports
Reports
Input
Input
System Controls & Programs
System Controls & Programs
Output
Environment Control Information
Output
Process
Process
User Interfaces

FIG. 11

Internal/External Section Control Data

to Map Changed Data to and from a Modifiable Digital Device Entity

A number is assigned during each *change event* which contains a section (SID) in the Device Correlation Table (DCT). Each Section Data Location, D(b,e), is encoded such that b specifies a beginning-offset and e specifies an end-offset (in bits, in a specific section). The data which was actually changed is in a bitstream following the control data and is represented below as C(t), "changed section in time".

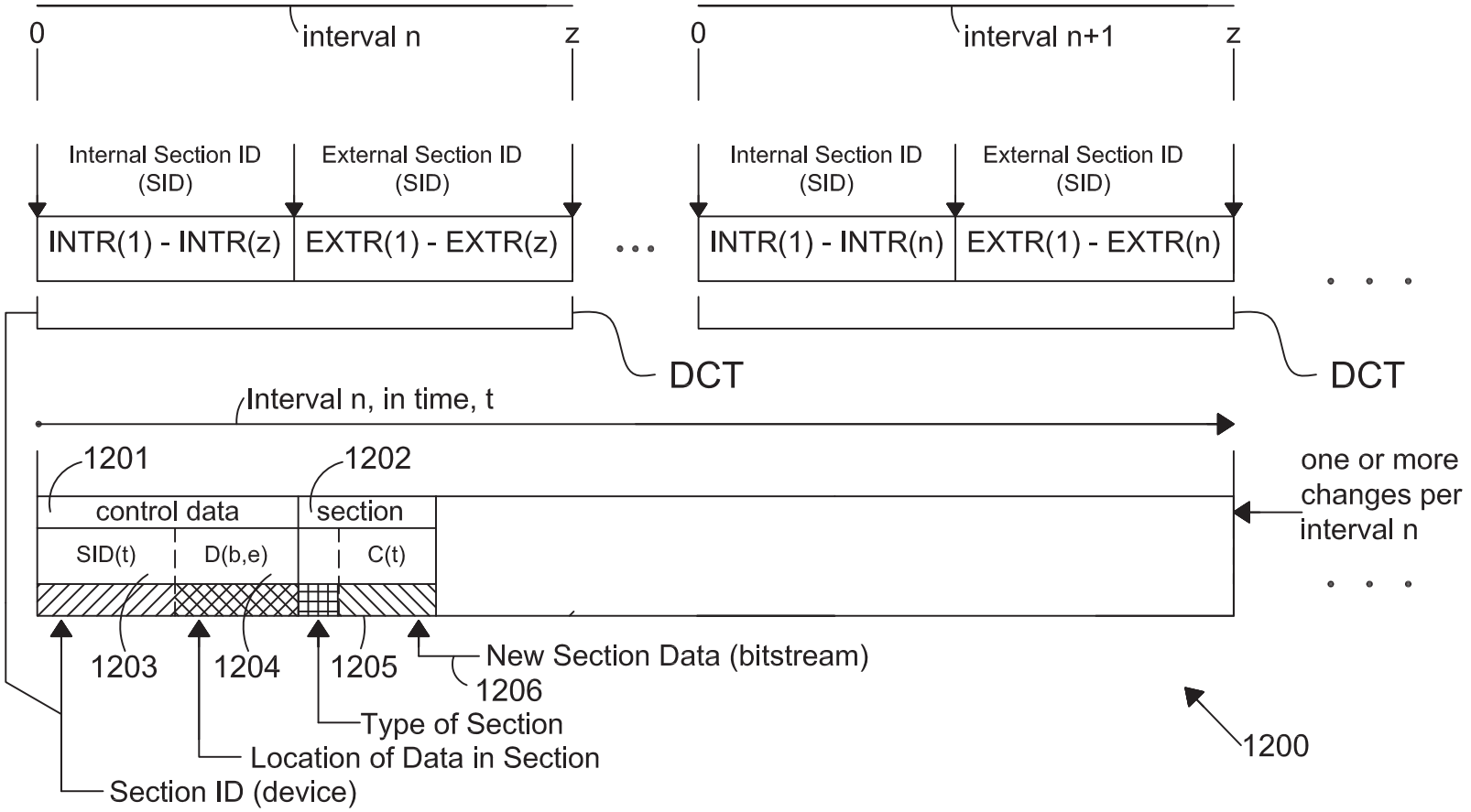

FIG. 12

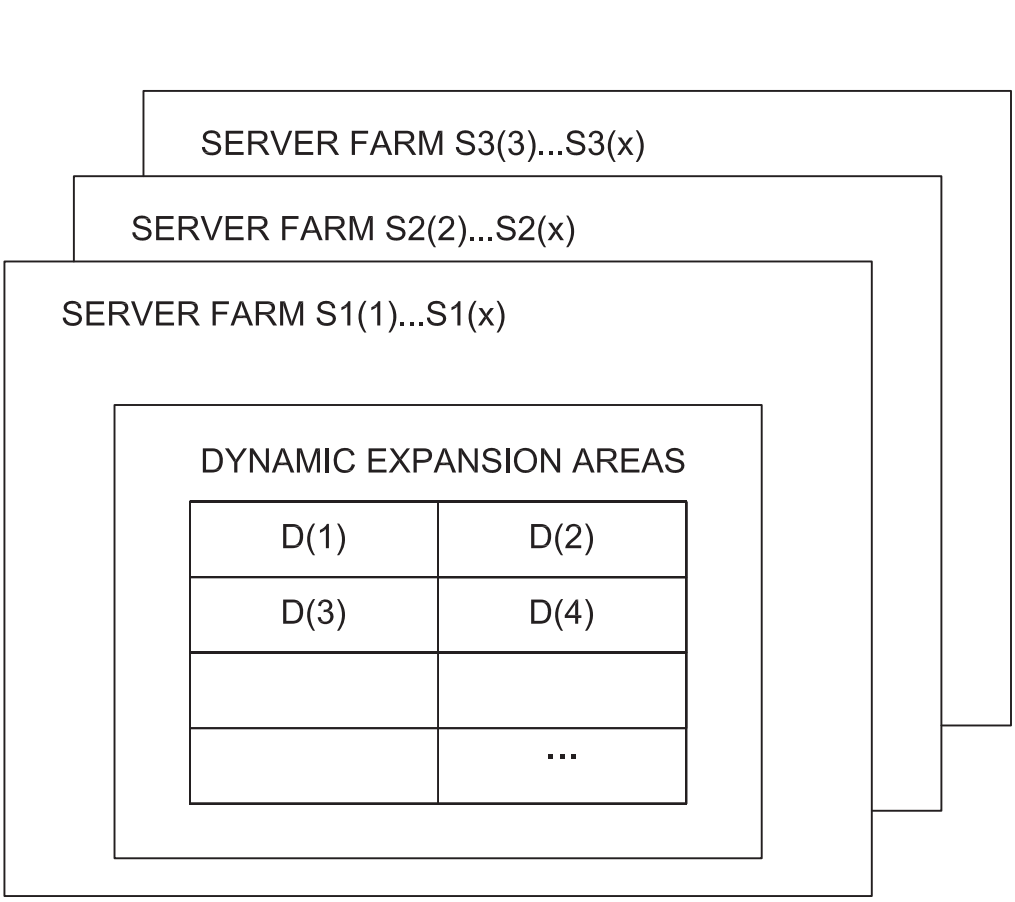
SERVER FARM S3(3)...S3(x)
SERVER FARM S2(2)...S2(x)
SERVER FARM S1(1)...S1(x)
DYNAMIC EXPANSION AREAS
D(1)
D(2)
D(3)
D(4)
...

FIG. 13

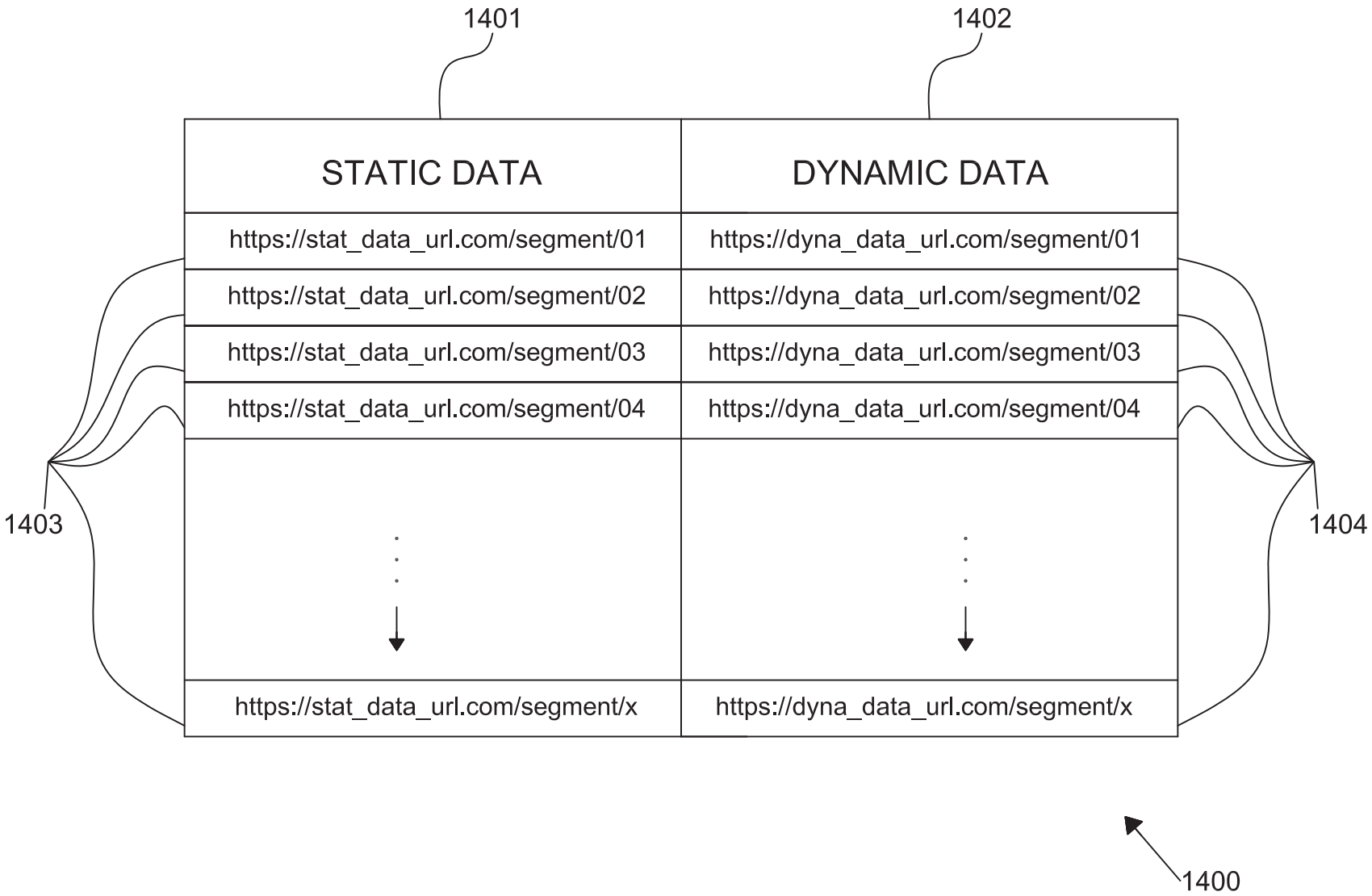
1401
1402
STATIC DATA
DYNAMIC DATA
https://stat_data_url.com/segment/01
https://dyna_data_url.com/segment/01
https://stat_data_url.com/segment/02
https://dyna_data_url.com/segment/02
https://stat_data_url.com/segment/03
https://dyna_data_url.com/segment/03
https://stat_data_url.com/segment/04
https://dyna_data_url.com/segment/04
https://stat_data_url.com/segment/x
https://dyna_data_url.com/segment/x
1403
1404
1400

FIG. 14

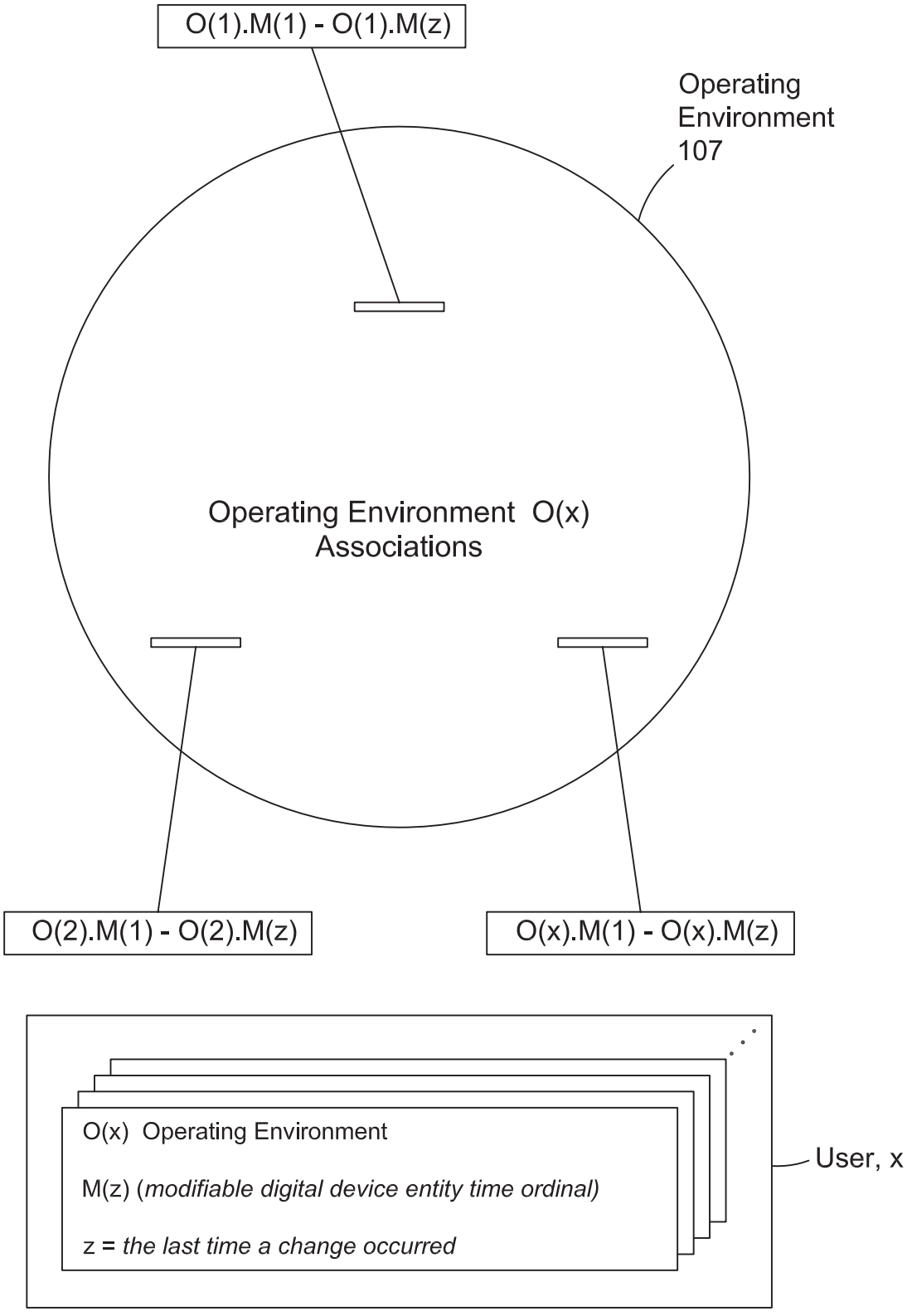
O(1).M(1) - O(1).M(z)
Operating
Environment
107
Operating Environment O(x)
Associations
O(2).M(1) - O(2).M(z)
O(x).M(1) - O(x).M(z)
O(x) Operating Environment
M(z) (modifiable digital device entity time ordinal)
z = the last time a change occurred
User, x

FIG. 15

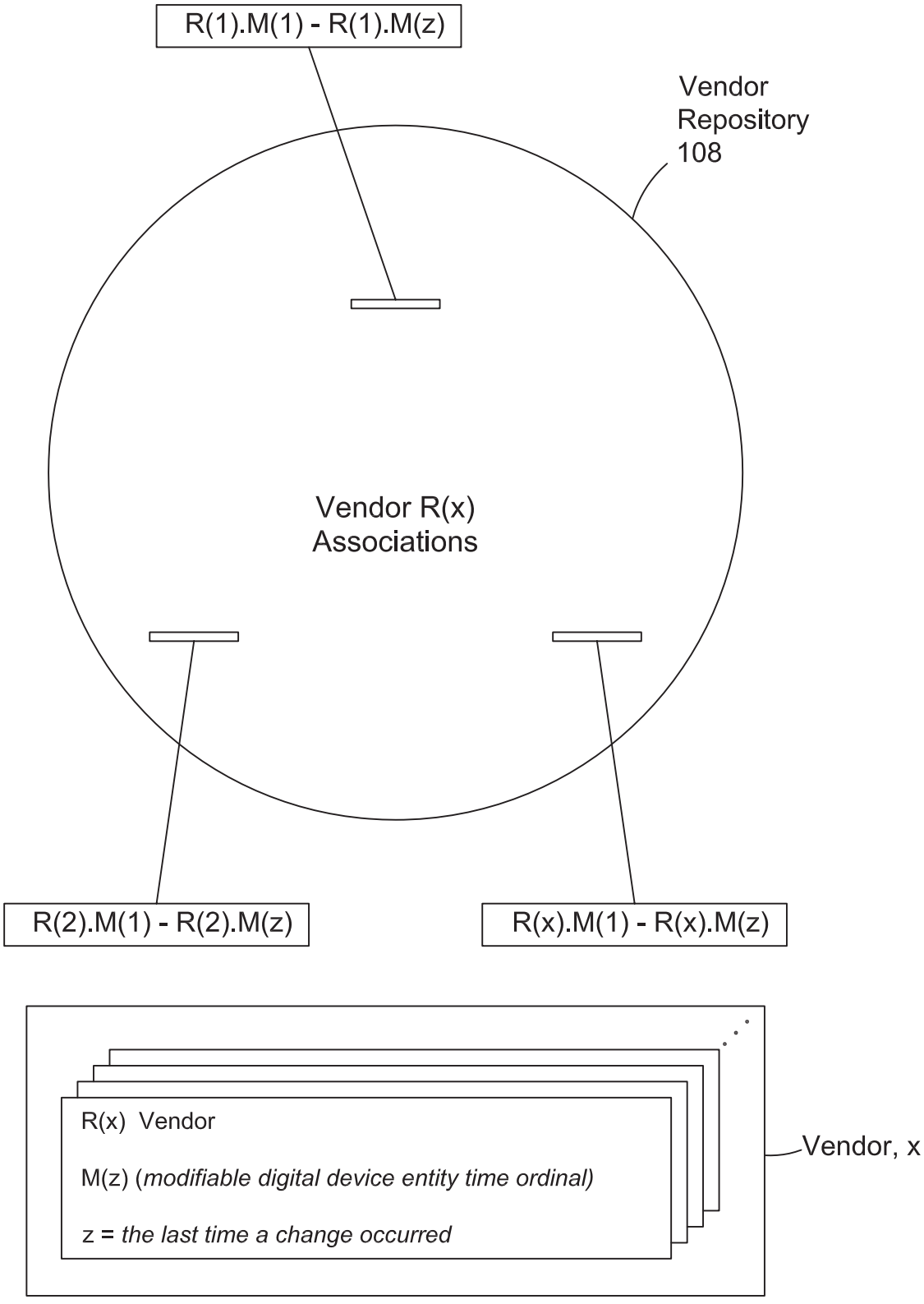
R(1).M(1) - R(1).M(z)
Vendor
Repository
108
Vendor R(x)
Associations
R(2).M(1) - R(2).M(z)
R(x).M(1) - R(x).M(z)
R(x) Vendor
M(z) (modifiable digital device entity time ordinal)
z = the last time a change occurred
Vendor, x

FIG. 16

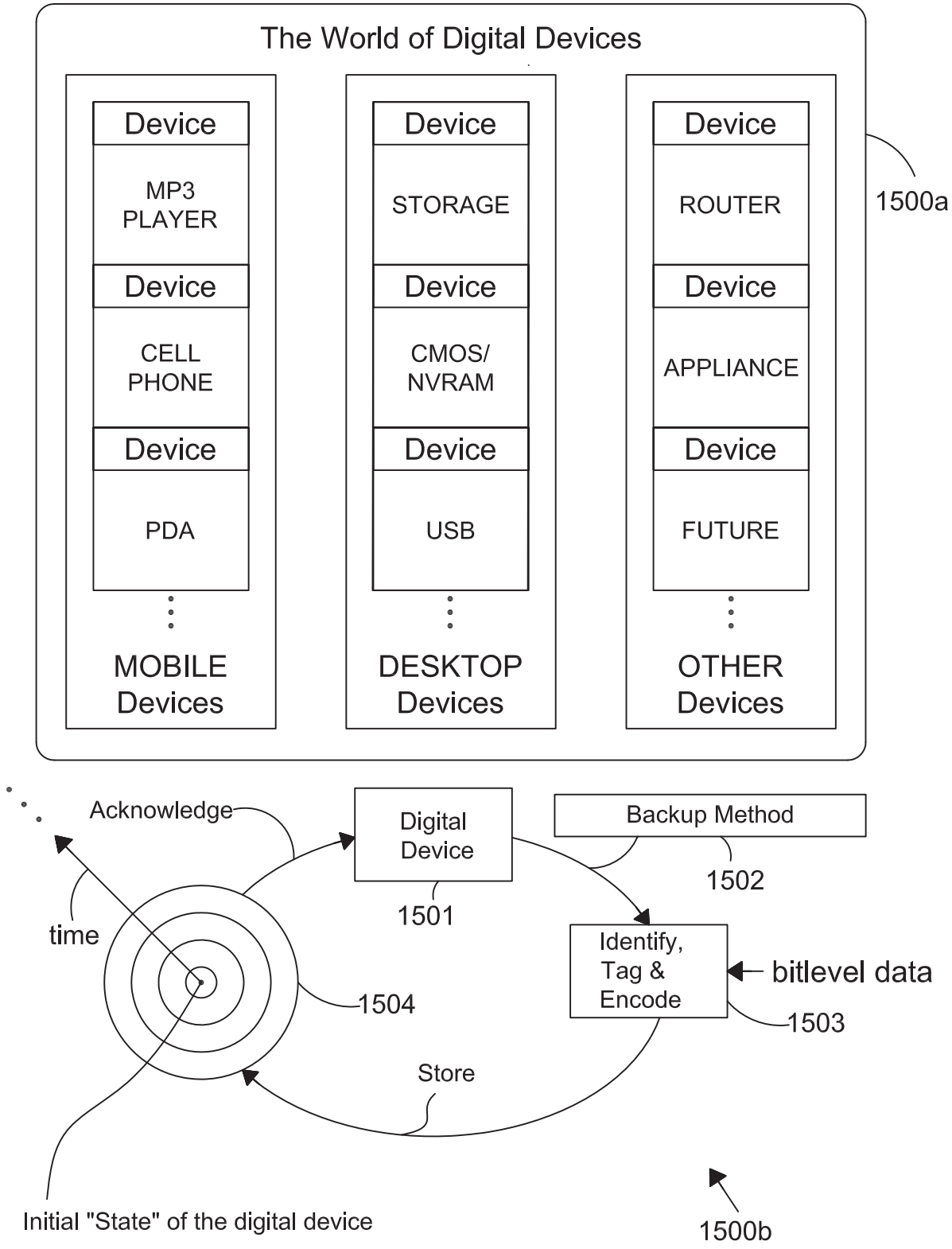
The World of Digital Devices
Device
MP3 PLAYER
Device
CELL PHONE
Device
PDA
MOBILE Devices
Device
STORAGE
Device
CMOS/ NVRAM
Device
USB
DESKTOP Devices
Device
ROUTER
Device
APPLIANCE
Device
FUTURE
OTHER Devices
1500a
Acknowledge
Digital Device
1501
Backup Method
1502
time
Identify, Tag & Encode
bitlevel data
1503
1504
Store
Initial "State" of the digital device
1500b

FIG. 17

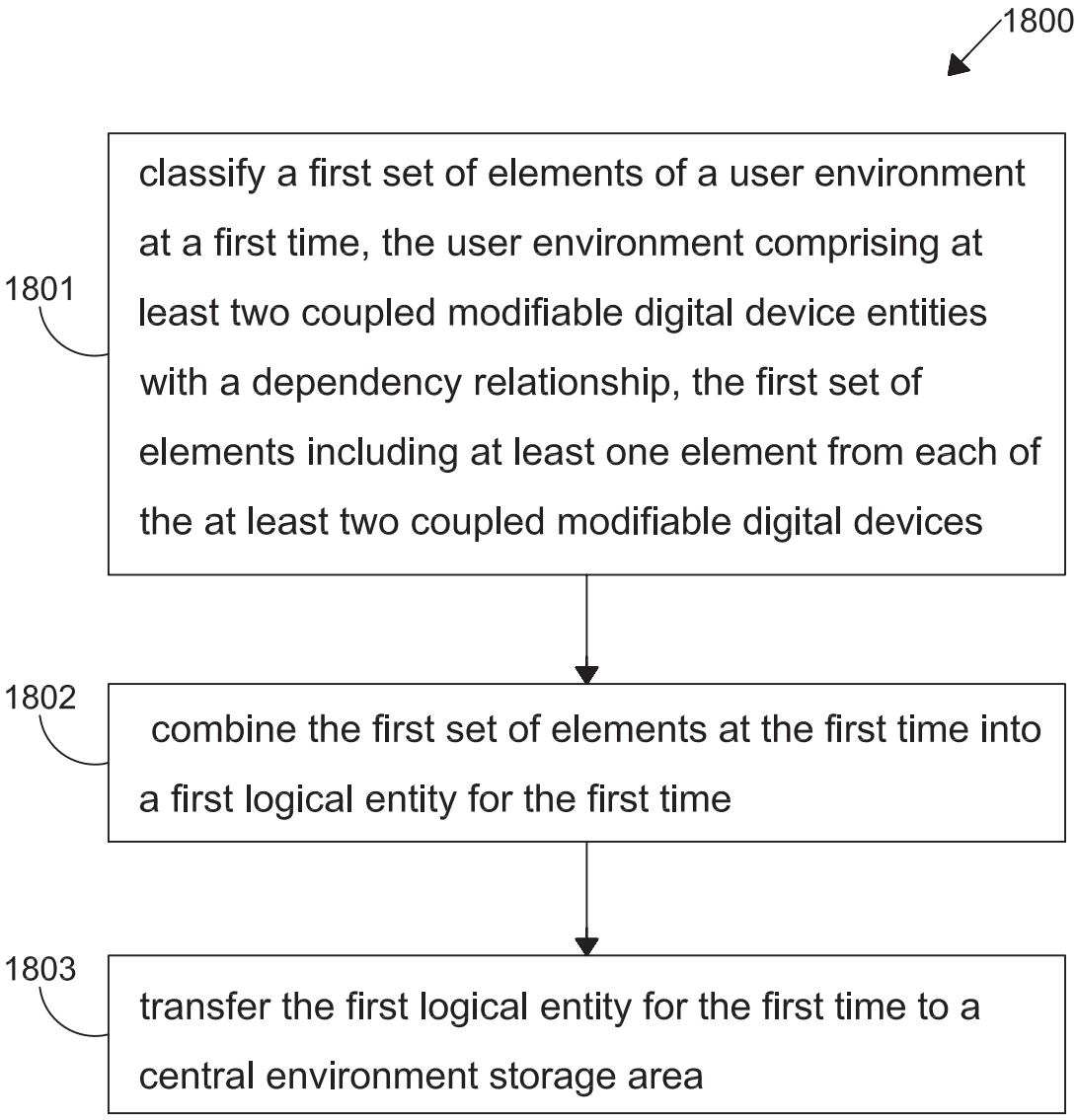
1800
1801
classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
1802
combine the first set of elements at the first time into a first logical entity for the first time
1803
transfer the first logical entity for the first time to a central environment storage area

FIG. 18

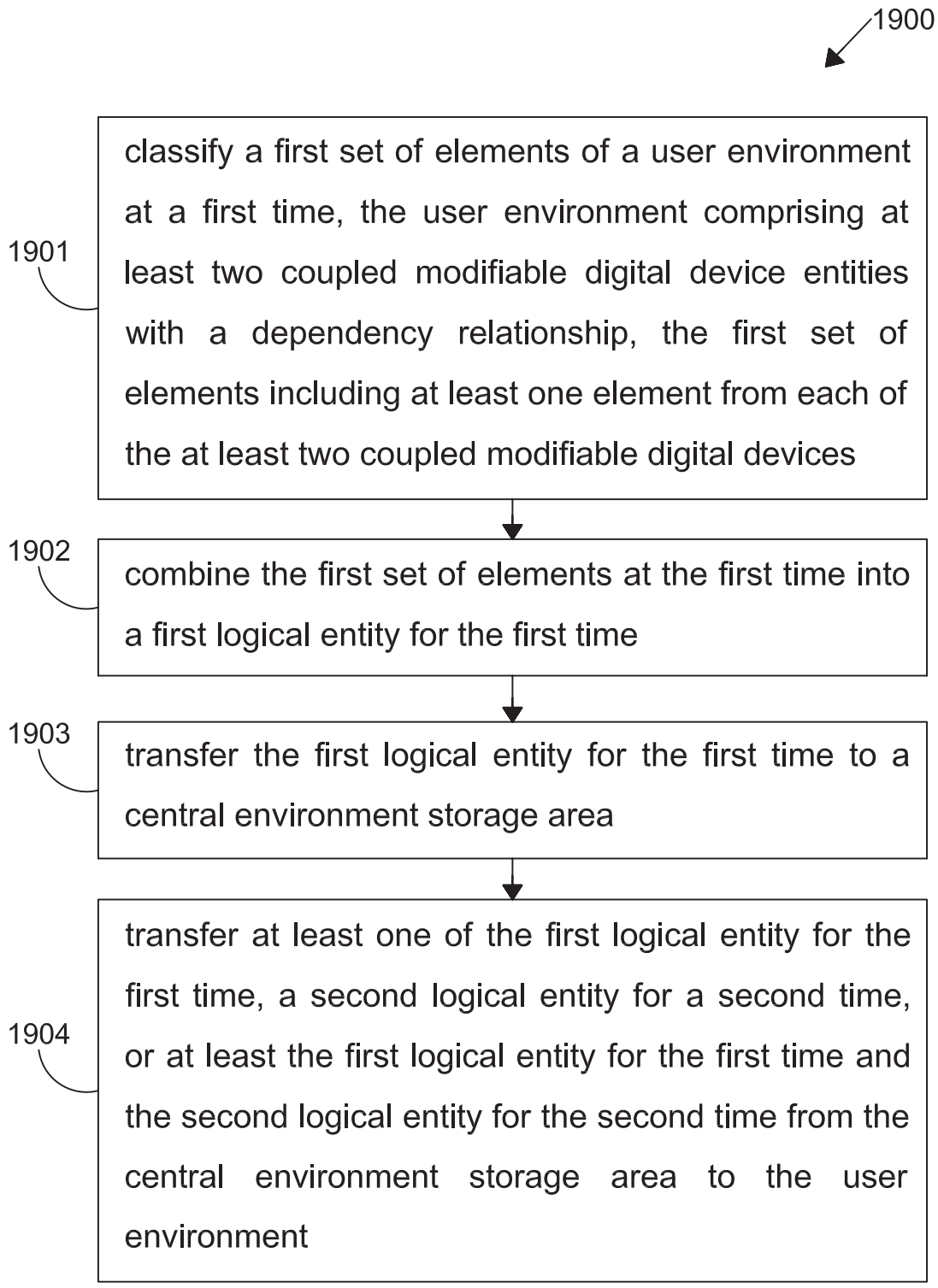
1900
1901
classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
1902
combine the first set of elements at the first time into a first logical entity for the first time
1903
transfer the first logical entity for the first time to a central environment storage area
1904
transfer at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time from the central environment storage area to the user environment

FIG. 19

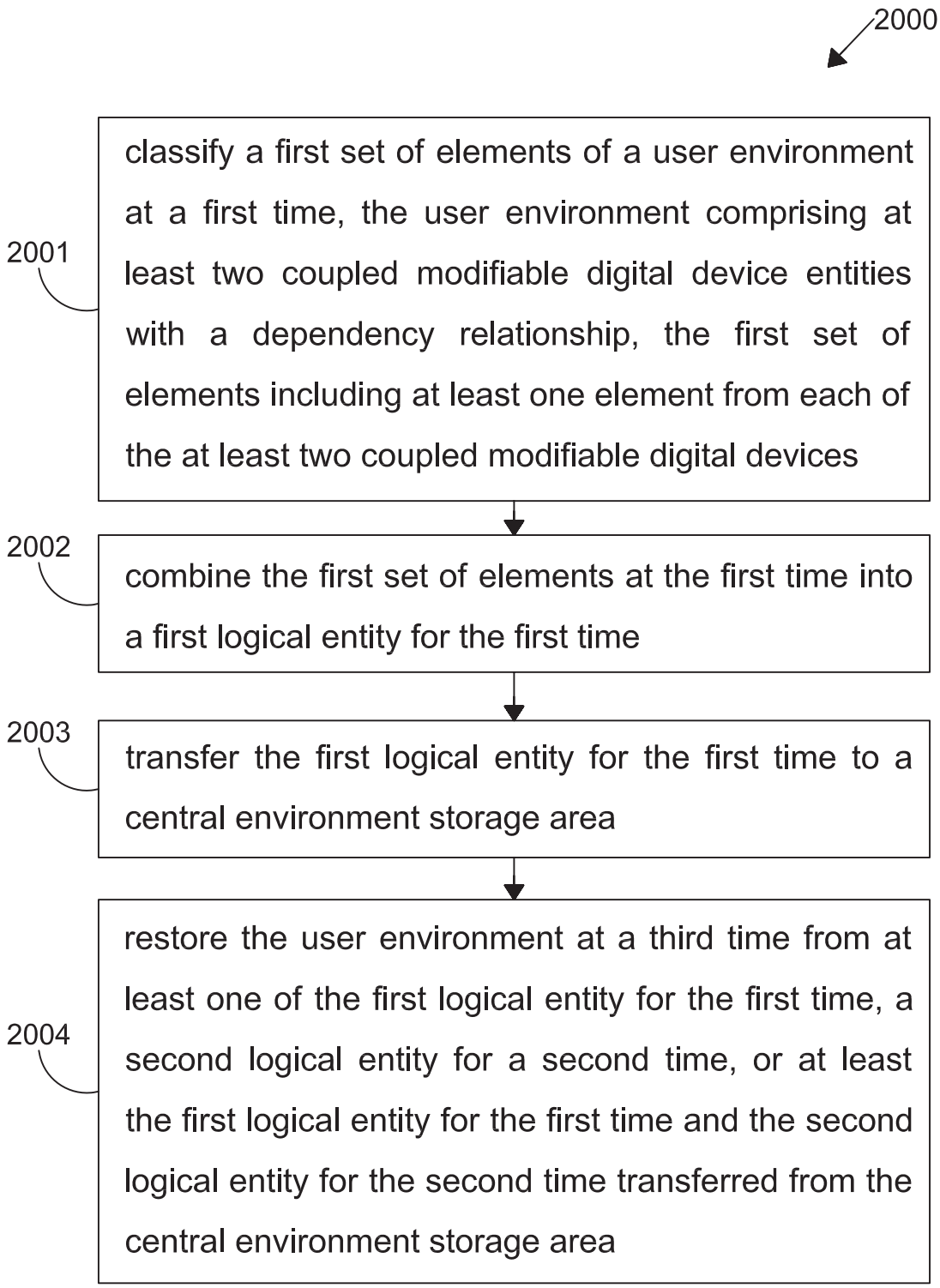
2000
2001
classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
2002
combine the first set of elements at the first time into a first logical entity for the first time
2003
transfer the first logical entity for the first time to a central environment storage area
2004
restore the user environment at a third time from at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time transferred from the central environment storage area

FIG. 20

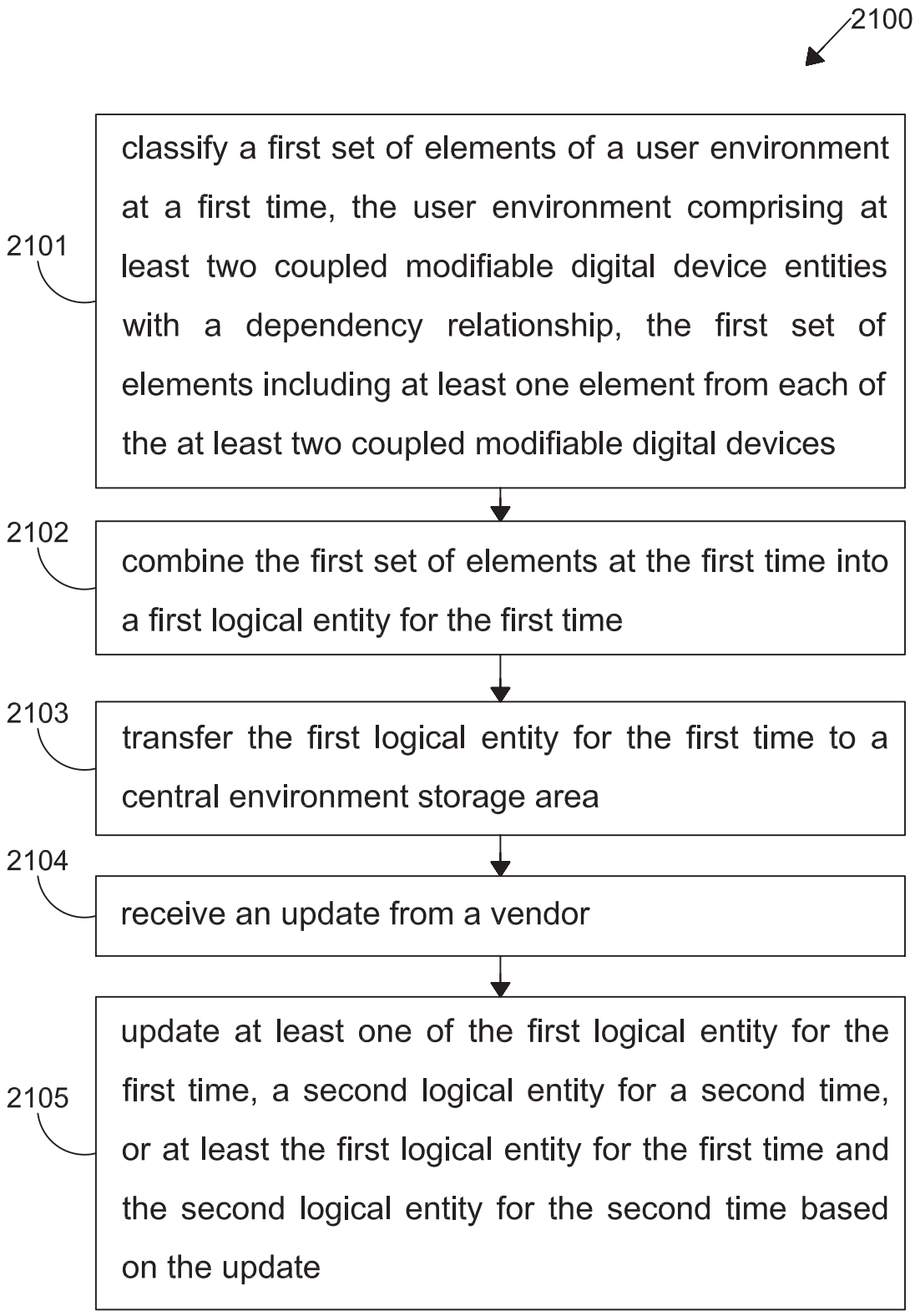
2100
2101
classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
2102
combine the first set of elements at the first time into a first logical entity for the first time
2103
transfer the first logical entity for the first time to a central environment storage area
2104
receive an update from a vendor
2105
update at least one of the first logical entity for the first time, a second logical entity for a second time, or at least the first logical entity for the first time and the second logical entity for the second time based on the update

FIG. 21

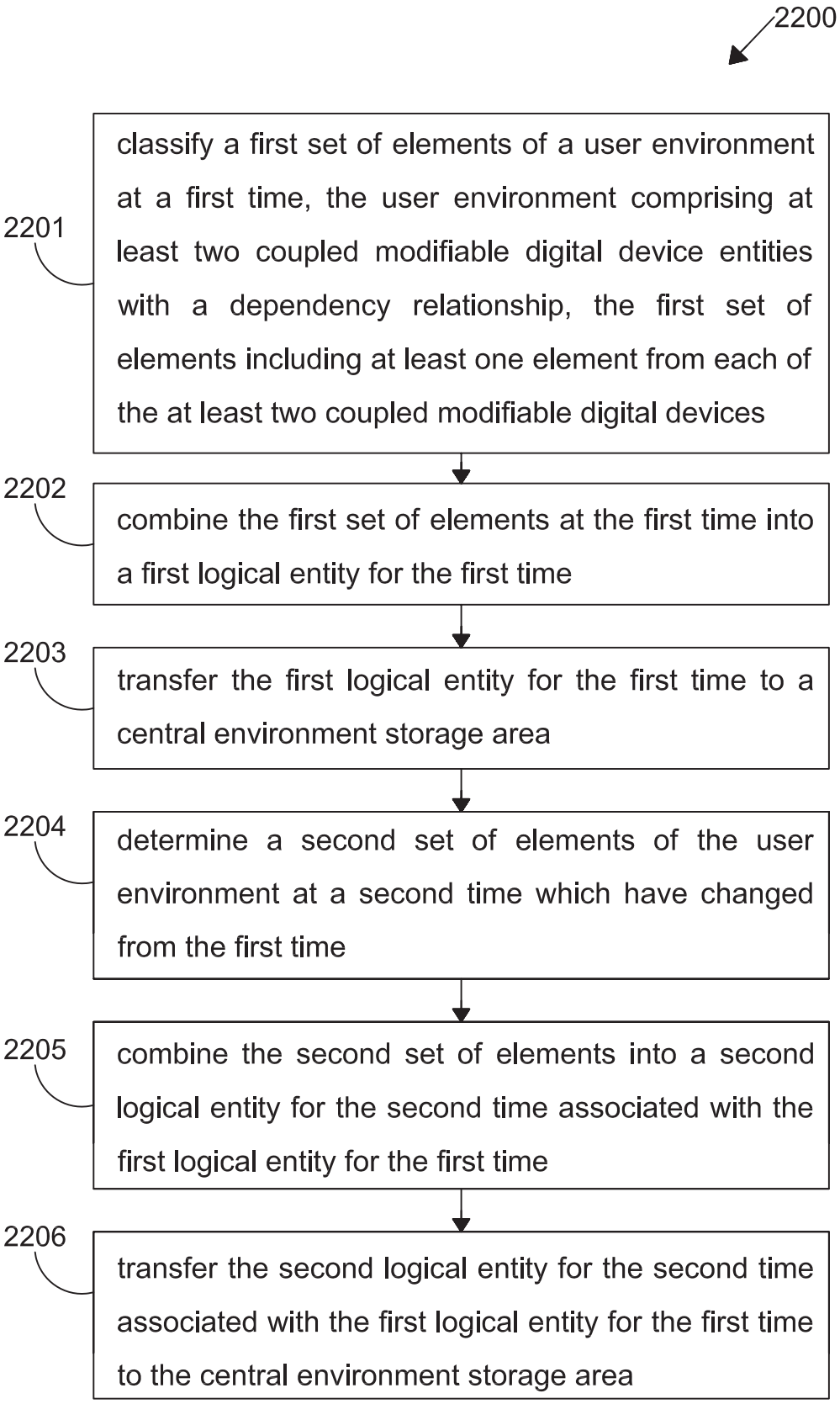
2200
2201
classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
2202
combine the first set of elements at the first time into a first logical entity for the first time
2203
transfer the first logical entity for the first time to a central environment storage area
2204
determine a second set of elements of the user environment at a second time which have changed from the first time
2205
combine the second set of elements into a second logical entity for the second time associated with the first logical entity for the first time
2206
transfer the second logical entity for the second time associated with the first logical entity for the first time to the central environment storage area

FIG. 22

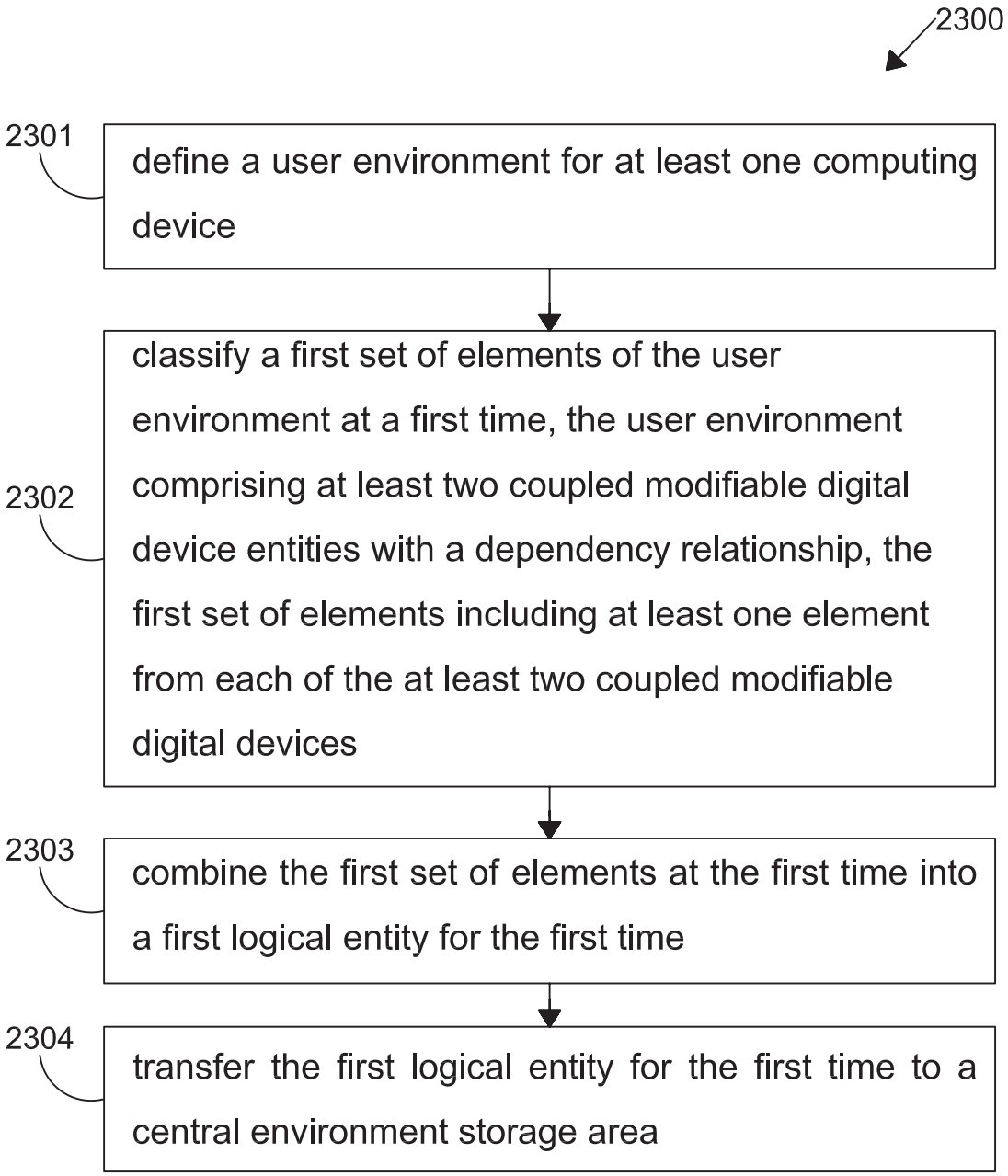
2300
2301
define a user environment for at least one computing device
2302
classify a first set of elements of the user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
2303
combine the first set of elements at the first time into a first logical entity for the first time
2304
transfer the first logical entity for the first time to a central environment storage area

FIG. 23

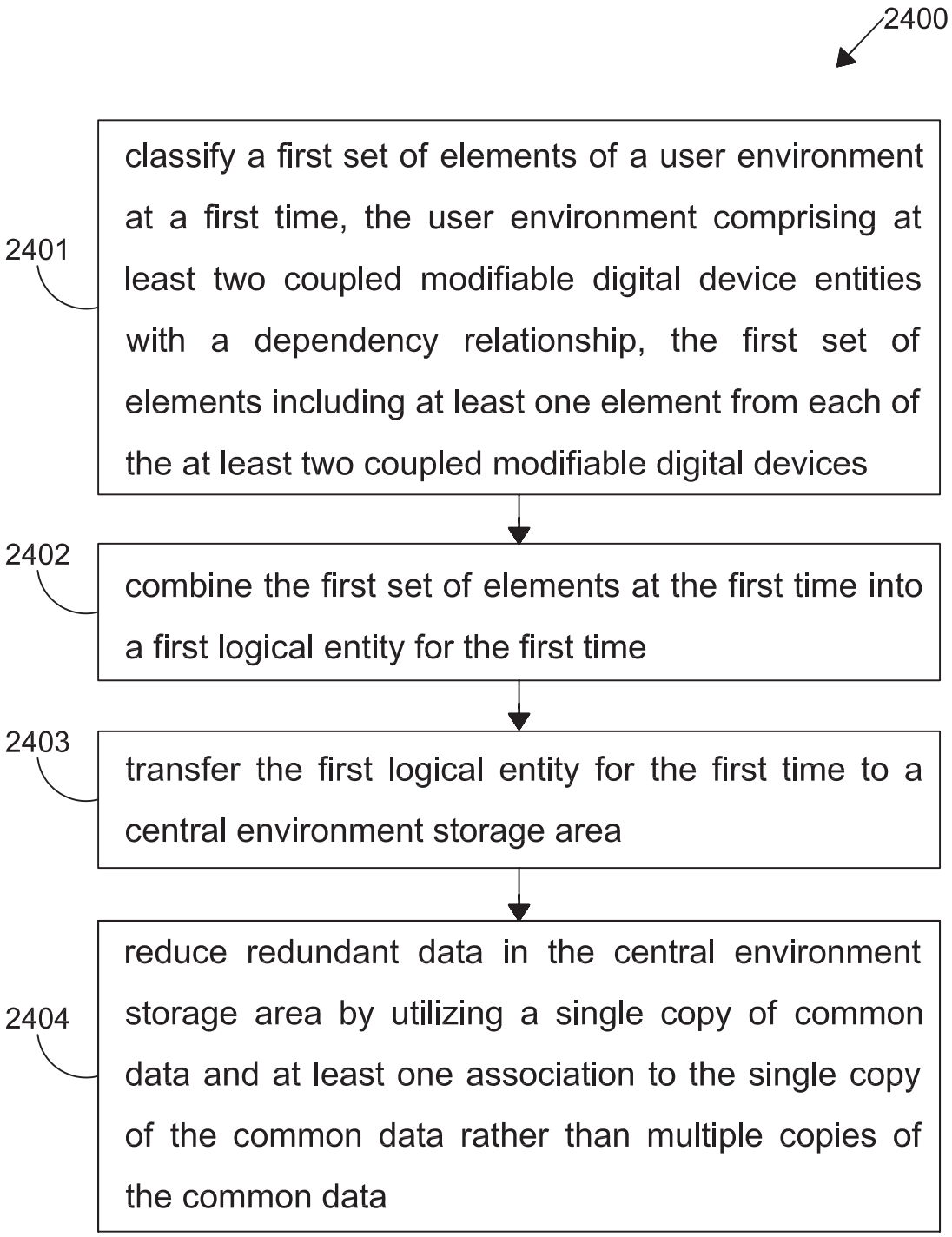
2400
2401
classify a first set of elements of a user environment at a first time, the user environment comprising at least two coupled modifiable digital device entities with a dependency relationship, the first set of elements including at least one element from each of the at least two coupled modifiable digital devices
2402
combine the first set of elements at the first time into a first logical entity for the first time
2403
transfer the first logical entity for the first time to a central environment storage area
2404
reduce redundant data in the central environment storage area by utilizing a single copy of common data and at least one association to the single copy of the common data rather than multiple copies of the common data

FIG. 24