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(54) **APPLICATION ASSISTED SOFTWARE UPDATE FOR CONNECTED DEVICES WITHOUT A DISPLAY**

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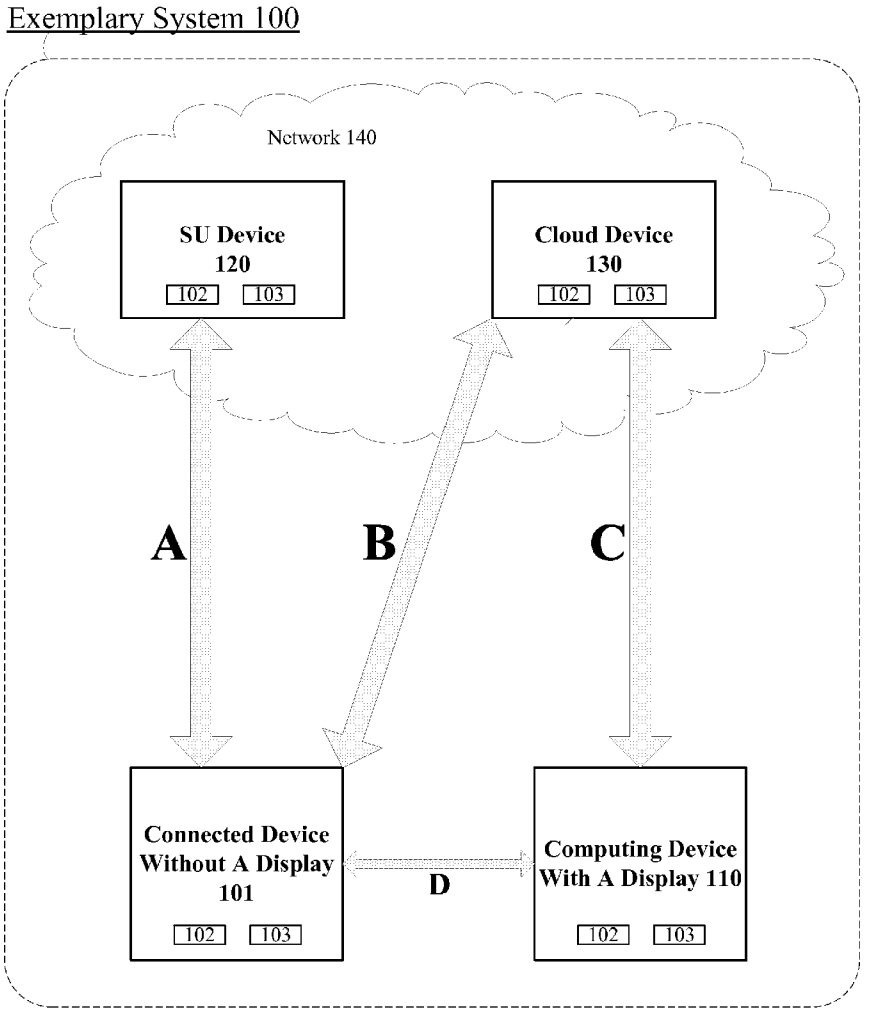
CPC . ***G06F 8/65*** (2013.01); ***H04L 67/10*** (2013.01)

(57) **ABSTRACT**

An exemplary system and method avoids unannounced software updates for a connected device by acquiring installation consent from the user for each software update to the connected device. Consent is acquired by leveraging an extended interface application described below, to facilitate notifications from the connected device to the user and receive user inputs indicating consent in response to the notifications.



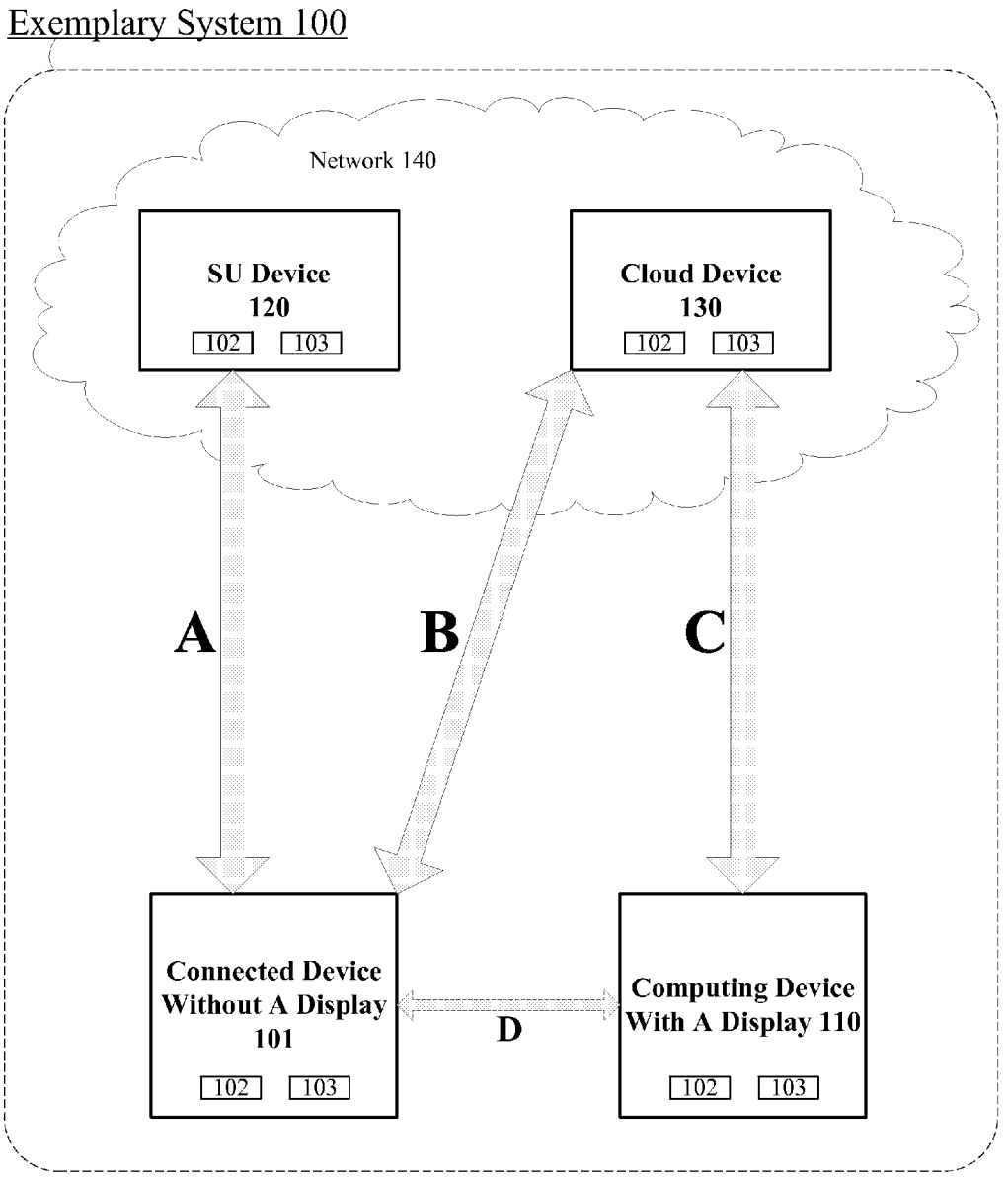

Exemplary System 100
Network 140
SU Device
120
102
103
Cloud Device
130
102
103
A
B
C
Connected Device
Without A Display
101
102
103
D
Computing Device
With A Display 110
102
103

Figure 1A

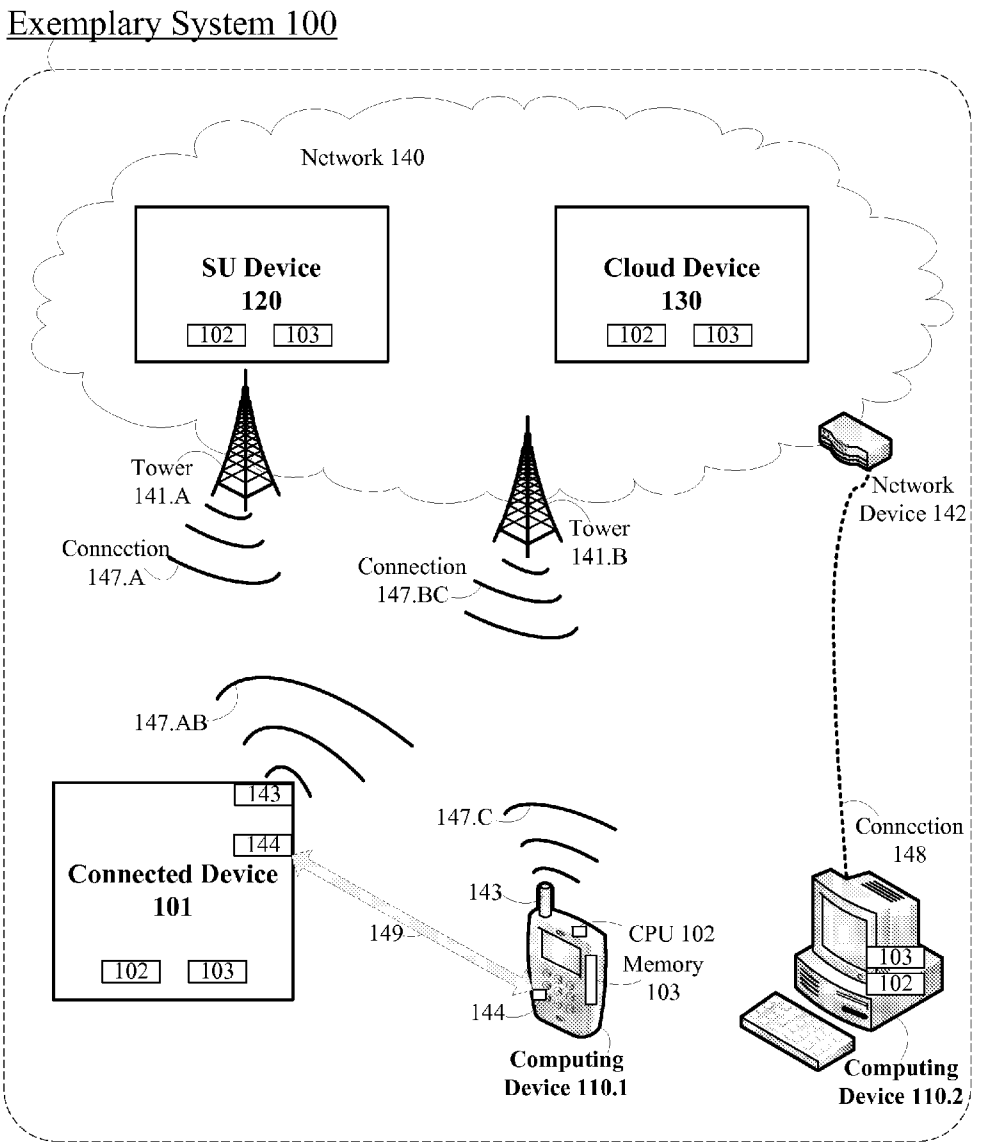

Exemplary System 100
Network 140
SU Device
120
102
103
Cloud Device
130
102
103
Tower
141.A
Connection
147.A
Tower
141.B
Connection
147.BC
Network
Device 142
147.AB
143
144
Connected Device
101
102
103
147.C
143
149
144
CPU 102
Memory
103
Computing
Device 110.1
Connection
148
103
102
Computing
Device 110.2

Figure 1B

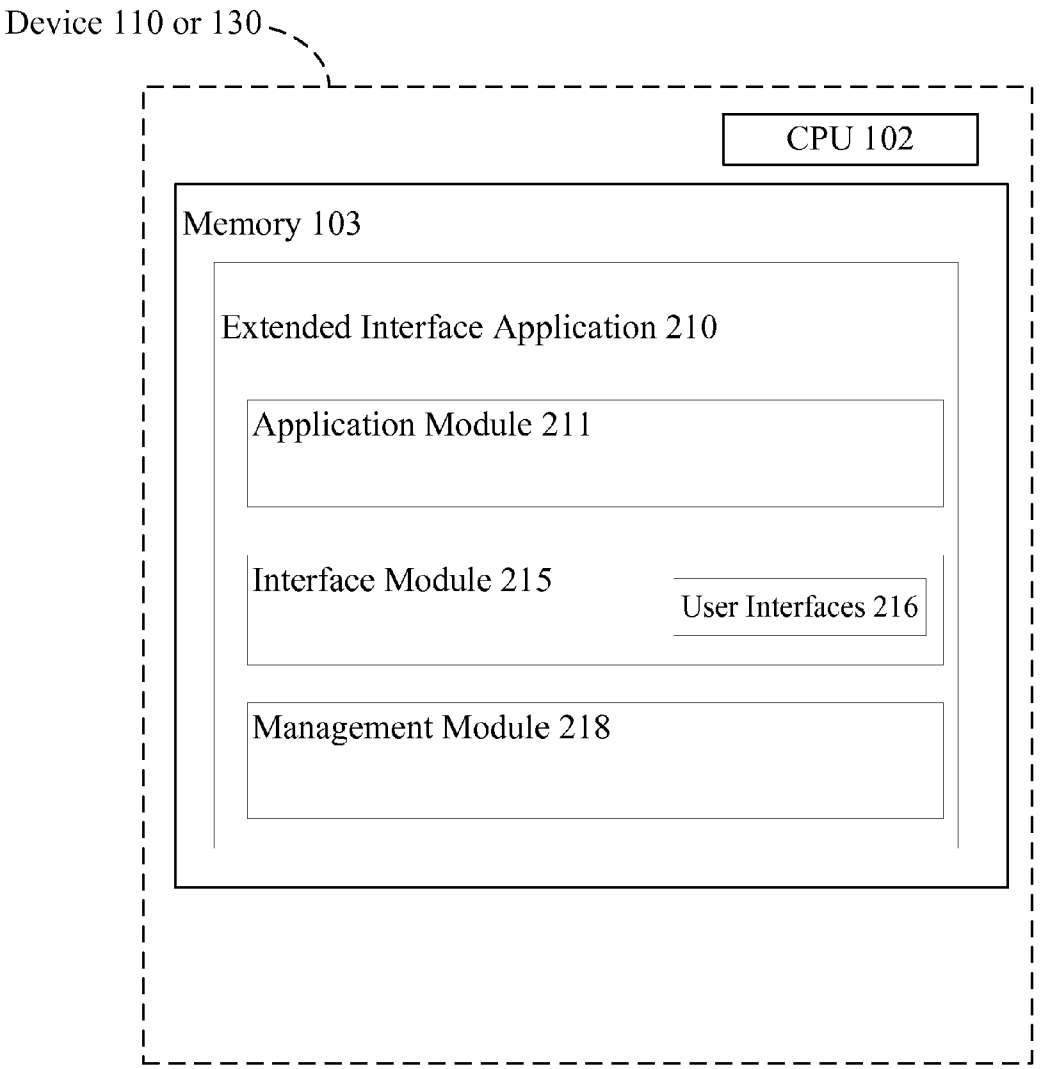

Device 110 or 130
CPU 102
Memory 103
Extended Interface Application 210
Application Module 211
Interface Module 215
User Interfaces 216
Management Module 218

Figure 2

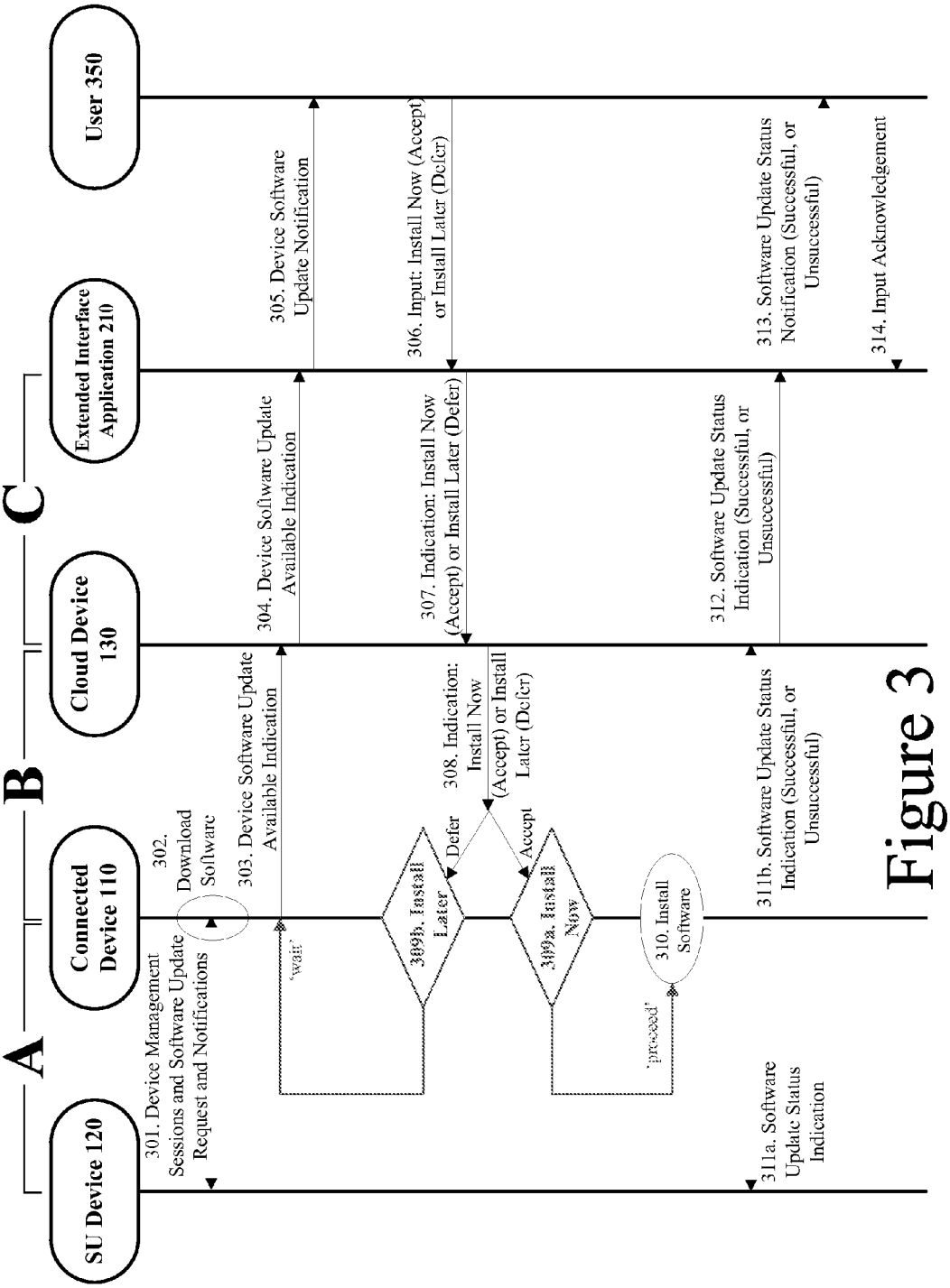

A
B
C
SU Device 120
Connected Device 110
Cloud Device 130
Extended Interface Application 210
User 350
301. Device Management Sessions and Software Update Request and Notifications
302. Download Software
303. Device Software Update Available Indication
304. Device Software Update Available Indication
305. Device Software Update Notification
306. Input: Install Now (Accept) or Install Later (Defer)
307. Indication: Install Now (Accept) or Install Later (Defer)
308. Indication: Install Now (Accept) or Install Later (Defer)
309a. Install Now
309b. Install Later
Defer
Accept
'wait'
'proceed'
310. Install Software
311a. Software Update Status Indication
311b. Software Update Status Indication (Successful, or Unsuccessful)
312. Software Update Status Indication (Successful, or Unsuccessful)
313. Software Update Status Notification (Successful, or Unsuccessful)
314. Input Acknowledgement

Figure 3

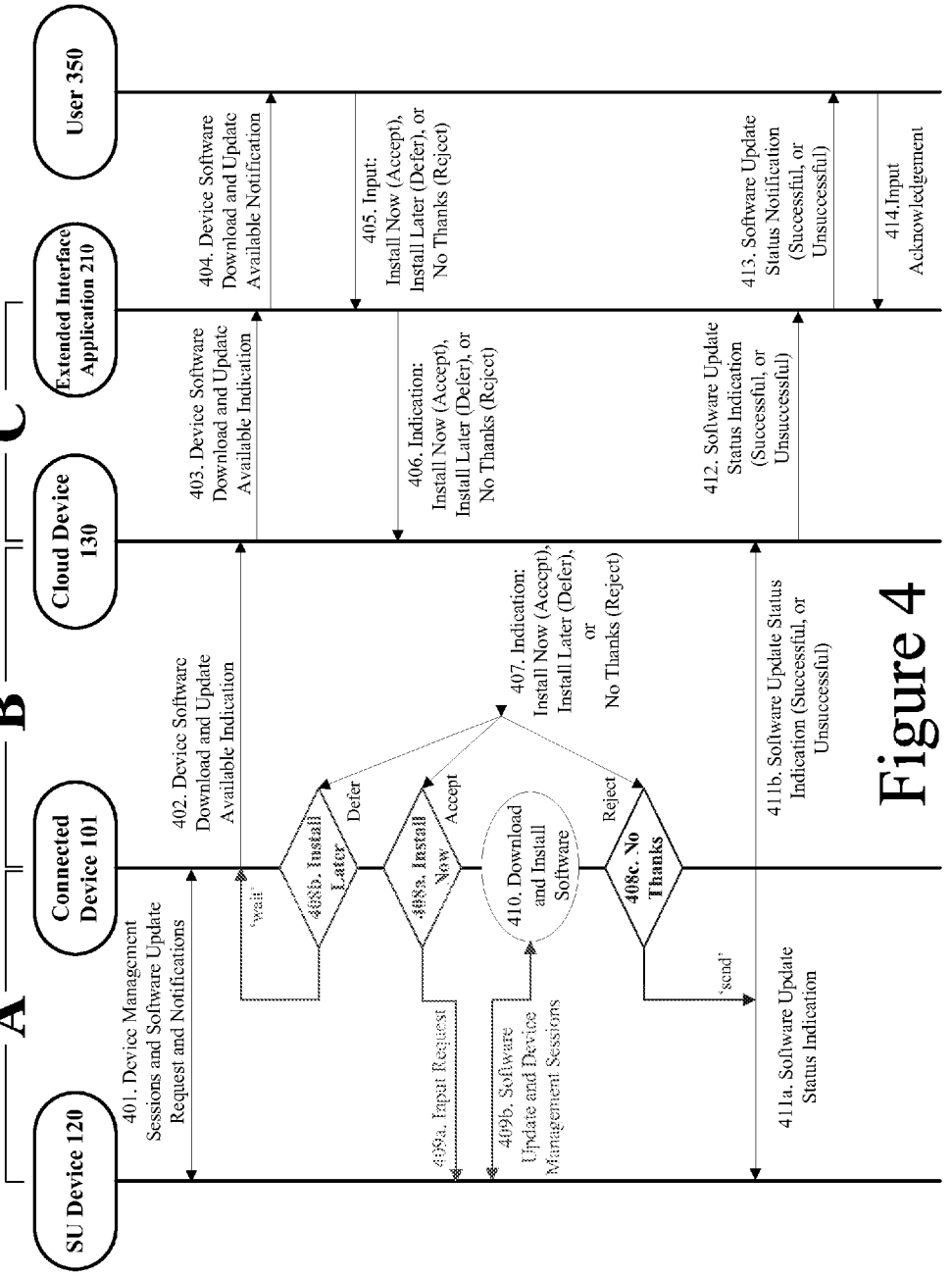

A
B
C
SU Device 120
Connected Device 101
Cloud Device 130
Extended Interface Application 210
User 350
401. Device Management Sessions and Software Update Request and Notifications
402. Device Software Download and Update Available Indication
403. Device Software Download and Update Available Indication
404. Device Software Download and Update Available Notification
405. Input: Install Now (Accept), Install Later (Defer), or No Thanks (Reject)
406. Indication: Install Now (Accept), Install Later (Defer), or No Thanks (Reject)
407. Indication: Install Now (Accept), Install Later (Defer), or No Thanks (Reject)
408a. Install Now
Accept
408b. Install Later
Defer
'wait'
408c. No Thanks
Reject
'send'
409a. Input Request
409b. Software Update and Device Management Sessions
410. Download and Install Software
411a. Software Update Status Indication
411b. Software Update Status Indication (Successful, or Unsuccessful)
412. Software Update Status Indication (Successful, or Unsuccessful)
413. Software Update Status Notification (Successful, or Unsuccessful)
414. Input Acknowledgement

Figure 4

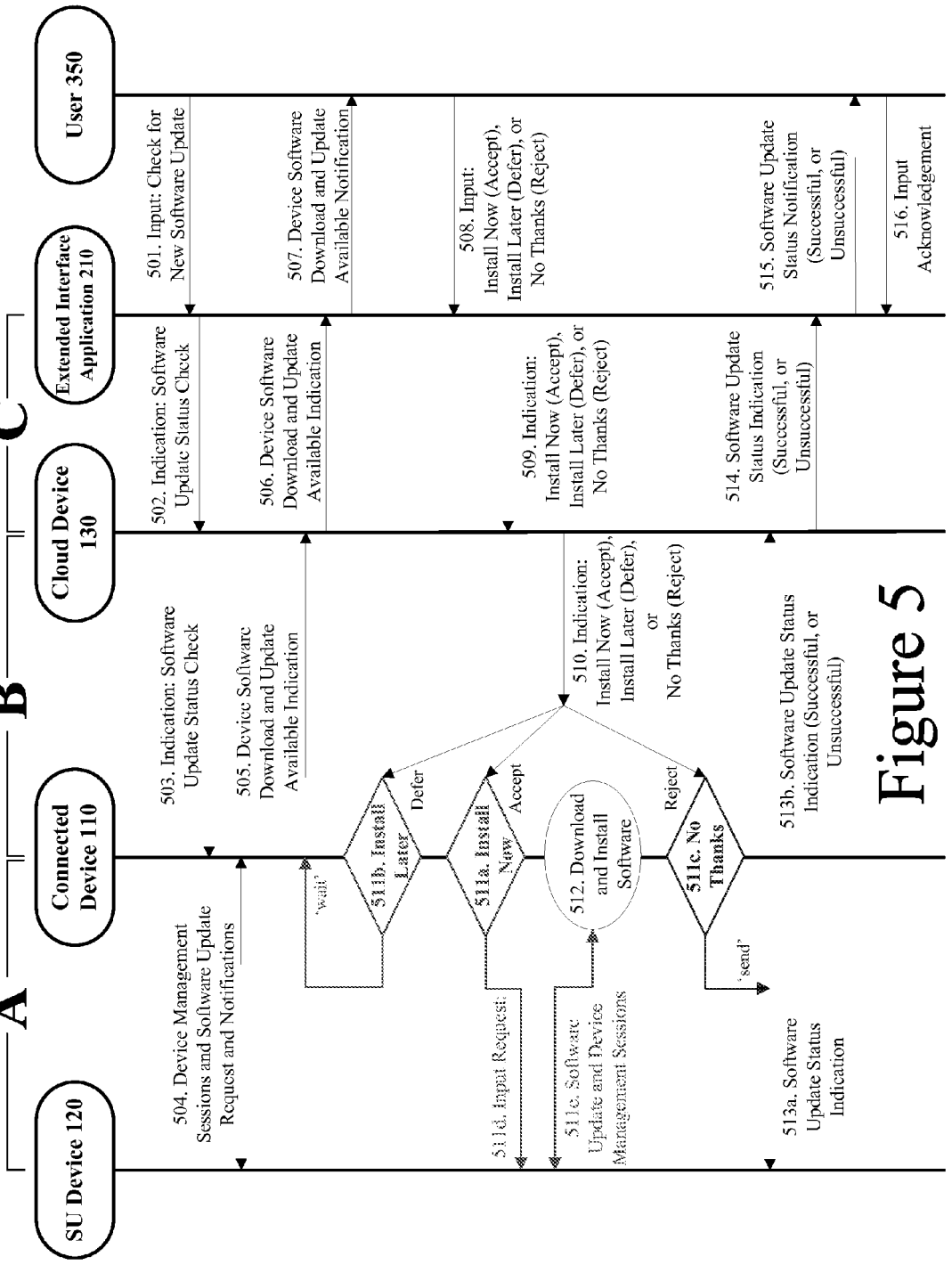

A
B
C
SU Device 120
Connected Device 110
Cloud Device 130
Extended Interface Application 210
User 350
501. Input: Check for New Software Update
502. Indication: Software Update Status Check
503. Indication: Software Update Status Check
504. Device Management Sessions and Software Update Request and Notifications
505. Device Software Download and Update Available Indication
506. Device Software Download and Update Available Indication
507. Device Software Download and Update Available Notification
508. Input: Install Now (Accept), Install Later (Defer), or No Thanks (Reject)
509. Indication: Install Now (Accept), Install Later (Defer), or No Thanks (Reject)
510. Indication: Install Now (Accept), Install Later (Defer), or No Thanks (Reject)
511a. Install Now
511b. Install Later
511c. No Thanks
Accept
Defer
Reject
'wait'
'send'
511d. Input Request
511e. Software Update and Device Management Sessions
512. Download and Install Software
513a. Software Update Status Indication
513b. Software Update Status Indication (Successful, or Unsuccessful)
514. Software Update Status Indication (Successful, or Unsuccessful)
515. Software Update Status Notification (Successful, or Unsuccessful)
516. Input Acknowledgement

Figure 5

APPLICATION ASSISTED SOFTWARE UPDATE FOR CONNECTED DEVICES WITHOUT A DISPLAY

BACKGROUND

[0001] A device without a display is generally any electronic hardware that operates without a constant need for human control of underlying software. For instance, a network router once configured may manage a set of network connections without user manipulation of router software. Similarly, a key remote for a motor vehicle once programmed may be utilized by a user to unlock doors, arm/disarm security systems, etc. without the user configuring key remote software prior to every use.

[0002] A device without a display may further be connected to a system. Taking the examples above, the router and the key remote may include communication technology that connects these devices to a system, which updates to the respective underlying software.

[0003] However, an unannounced software update, e.g., when a connected device without a display proceeds with the software updates without user notifications and/or confirmations, may interrupt an important usage of the connected device; cause the connected device to be perceived as malfunctioning or broken; cause the connected device to disconnect from the system; and/or cause the connected device to power cycle, each of which would prevent the seamless operation of the connected device.

[0004] Thus, there is a need for a system that enables connected devices without a display to receive consent from a user or third party before a software update.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIGS. **1**A-B illustrate an exemplary system in which a connected device without a display and a computing device operate; and

[0006] FIG. **2** illustrates an exemplary schematic of an application of a computing device;

[0007] FIG. **3** illustrates an exemplary process flow regarding a network initiated operation relating to a mandatory severity software package;

[0008] FIG. **4** illustrates an exemplary process flow regarding a network initiated operation relating to an optional severity software package; and

[0009] FIG. **5** illustrates an exemplary process flow regarding a user initiated operation relating to a mandatory or optional severity software package.

DETAILED DESCRIPTION

[0010] A system and method avoids unannounced software updates for a connected device by acquiring installation consent from the user for each software update to the connected device. Consent is acquired by leveraging an extended interface application described below, to facilitate notifications from the connected device to the user and receive user inputs indicating consent in response to the notifications. The extended interface application may be located and directly accessed on a user device, such as a computing device described below. The extended interface application may also be located on a remote device, such as the cloud device described below, which is accessed from the user device via a web portal.

[0011] FIG. **1**A illustrates an exemplary system **100** having a connected device without a display ("connected device") **101** that leverages a computing device **110** to acquire an installation consent. Further, FIG. **1**A illustrates a Software Update ("SU") device **120** and a cloud device **130**, which may generally be servers as described below, that communicate with the connected and computing devices **101**, **110** from a network **140** in support of acquiring an installation consent.

[0012] In one exemplary communication operation, the SU device **120** may inform the connected device **101** that a software package is available to download, and in turn the connected device **101** downloads the software package (see Arrow A). The connected device **101** further requires an installation consent from a user or third party before installation of the software package to avoid the unannounced device software update discussed above.

[0013] To acquire the installation consent, the connected device **101** may send a software update available indication to the cloud device **130** (see Arrow B), which forwards the software update available indication to the computing device **110** (see Arrow C). The computing device **110** may operate an extended interface application (described below with reference to FIG. **2**) to then generate user interfaces to provide a software update available notification to and receive an input that may indicate the installation consent from the user or third party. The connected device **101** may also leverage the extended interface application to acquire the installation consent on the cloud device **130** to communicate notifications and receive inputs via a web portal of the computing device **110**. The input received via the extended interface applications and/or web portals may generally indicate user acceptance, deferral, or rejection of the software package.

[0014] In response to the input, the computing device **110** may send a response indication based on the input to the cloud device **130** (see Arrow C). The cloud device **130** may forward the response indication to the connected device **101** (see Arrow B). Based on the response indication, e.g., accept, defer, or reject, the connected device **101** performs a particular operation. For, example, when the input was an acceptance of the software package, the response indication triggers an installation of the software package by the connected device **101**. In this way, the computing device **110** may be leveraged by the connected device **101** to acquire the installation consent in support of the Software Update (SU) experiences, alerts, and interactions.

[0015] In another exemplary communication operation, after the software package is communicated and downloaded by the connected device **101** (see Arrow A); the connected device **101** may directly communicate with the SU device **120** to exchange the software update available indication and the response indications (see Arrow D) rather than communicating indications through the cloud device **130**. In general, this direct communication operation (see Arrows A, D) may be utilized when the connected device **101** and computing device **110** are within a radio range that enables direct communication, as further described below. In comparison, the cloud device **130** communication operation above (see Arrows A, B, C) may generally be utilized regardless of a radio range between the connected device **101** and computing device **110**.

[0016] The exemplary system **100** and devices **101**, **110**, **120**, **130** may be any computing system and/or device that includes a processor and a memory (e.g. **102** and **103**, respectively). Computing systems and/or devices generally include

computer-executable instructions, where the instructions may be executable by one or more computing devices such as those listed below. Computer-executable instructions may be compiled or interpreted from computer programs created using a variety of programming languages and/or technologies, including, without limitation, and either alone or in combination, Java™, C, C++, Visual Basic, Java Script, Perl, etc. The exemplary system **100** and items therein (e.g., devices **101**, **110**, **120**, **130**) may take many different forms and include multiple and/or alternate components and facilities, as illustrated in the Figures further described below. While exemplary systems, devices, modules, and sub-modules are shown in the Figures, the exemplary components illustrated in the Figures are not intended to be limiting. Indeed, additional or alternative components and/or implementations may be used, and thus the above communication operation examples should not be construed as limiting.

[0017] In general, computing systems and/or devices (e.g., devices **101**, **110**, **120**, **130**) may employ any of a number of computer operating systems, including, but by no means limited to, versions and/or varieties of the Microsoft Windows® operating system, the Unix operating system (e.g., the Solaris® operating system distributed by Oracle Corporation of Redwood Shores, Calif.), the AIX UNIX operating system distributed by International Business Machines of Armonk, N.Y., the Linux operating system, the Mac OS X and iOS operating systems distributed by Apple Inc. of Cupertino, Calif., the BlackBerry OS distributed by Research In Motion of Waterloo, Canada, and the Android operating system developed by the Open Handset Alliance. Examples of computing systems and/or devices include, without limitation, cell phones, smart-phones, super-phones, tablet computers, next generation portable devices, mobile printers, handheld computers, secure voice communication equipment, or some other computing system and/or device. Alternatively, computing systems and/or devices may also be a computer workstation, a server, a desktop, a notebook, or a laptop.

[0018] Further, the processor or the microprocessor (e.g., CPUs **102**) of computing systems and/or devices receives instructions from the memory (e.g., memory **103**) and executes these instructions, thereby performing one or more processes, including one or more of the processes described herein. Such instructions and other data may be stored and transmitted using a variety of computer-readable mediums (e.g., memory **103**).

[0019] A CPU **102** may include processes comprised from any hardware, software, or combination of hardware or software that carries out instructions of a computer programs by performing logical and arithmetical calculations, such as adding or subtracting two or more numbers, comparing numbers, or jumping to a different part of the instructions. For example, the CPU **102** may be any one of, but not limited to single, dual, triple, or quad core processors (on one single chip), graphics processing units, visual processing units, and virtual processors.

[0020] A memory **103** may be, in general, any computer-readable medium (also referred to as a processor-readable medium) that may include any non-transitory (e.g., tangible) medium that participates in providing data (e.g., instructions) that may be read by a computer (e.g., by CPUs **102** of devices **101**, **110**, **120**, **130**). Such a medium may take many forms, including, but not limited to, non-volatile media and volatile media. Non-volatile media may include, for example, optical or magnetic disks and other persistent memory. Volatile media may include, for example, dynamic random access memory (DRAM), which typically constitutes a main memory. Such instructions may be transmitted by one or more transmission media, including radio waves, metal wire, fiber optics, and the like, including the wires that comprise a system bus coupled to a processor of a computer. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, DVD, any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, a RAM, a PROM, an EPROM, a FLASH-EEPROM, any other memory chip or cartridge, or any other medium from which a computer can read.

[0021] In some examples, the elements of the devices **101**, **110**, **120**, **130** may be implemented as computer-readable instructions (e.g., software) on one or more computing devices (e.g., servers, personal computers, etc.), stored on computer readable media associated therewith (e.g., disks, memories, etc.). A computer program product may comprise such instructions stored on computer readable media for carrying out the operations described herein.

[0022] The connected device **101** may generally be any electronic hardware that includes a central processing unit **102** and a memory **103**. The connected device **101** may notify the computing device **101** and by extension the user or third party and obtain/receive the installation consent before proceeding with installation of a software package on the connected device **101**.

[0023] A software package may be an upgrade of new software and/or bug fixes for a vertical application of the connected device **101**, along with operating system upgrades, firmware upgrades, devices drives, application programming interfaces, or the like.

[0024] A device driver is a computer routine that controls a particular physical component of device or a peripheral (e.g., a printer) attached to the device. Similar to a device driver is an OS Layer Kernel, which manages and translates input/output requests into data processing instructions for the central processing unit (e.g., CPU **102**).

[0025] An application programming interface (API) is a set of executable instructions that itemizes and implements the data structures, object classes, and variables that interact with the device drivers to operate physical components and that launch routines and/or programs.

[0026] The connected device **101** may also store in the memory **103** and run via the processor **102** a vertical application. A vertical application may be any software application that supports a specific device operation or business process. Vertical applications may be customized to meet the needs of the connected device **101** or user operating the connected device **101**.

[0027] Thus, the connected device **101** may via the vertical application communicate with the SU device **120** regarding software update availability, software package downloads, and local software status. The connected device **101** may also via the vertical application send and receive indications to and from the computing device **110** and/or the cloud device **130**. For example, the connected device **101** may send software update indications to the extended interface application based on a network initiated instruction by the SU device **120** (e.g., a network initiated operation) and receive the installation consent from the extended interface application.

[0028] Further, because the connected device **101** may generally operate without a display and/or be unable to support a

user interface, the connected device **101** may support a two-way communication, anywhere and anytime, between the connected device **101** and the extended interface application. And, although connected devices **101** do not include displays, connected devices **101** are not limited thereto, as connected devices **101** may have other reasons for leveraging computing devices **110** such as inaccessibility (e.g., a router may have a display and an interface while being located in an inaccessible location, such as a locked network closet). Examples of a connected device **101** may include, without limitation, network routers, network switches, phones, remotes, printers, monitoring equipment, near field communication transmitters and readers, appliances, home appliances, refrigerators, etc.

[0029] The computing device **110** may also generally be any hardware that includes a central processing unit **102** and a memory **103**. The computing device **110** may further connect to the system **100**, include a display, and/or support user interfaces. A display is an output device for presentation of information in visual or tactile form, such as user interfaces or web portals. Thus, a display of a computing device **110** may present user interfaces or a web portal to a user, such that the user may interact with and receive information from the connected device **101** (which generally do not have displays).

[0030] For instance, the computing device **110** may store the extended interface application (e.g., extended interface application **210** of FIG. **2** described below) on the memory **103**. The computing device **110** may then utilize the processor **102** to operate extended interface application to generate user interfaces on the display. The user interfaces may then acquire the installation consent in support of the SU experiences, alerts, and interactions, such as processing/generating software update available and response indications and receiving inputs from the user or third party.

[0031] Examples of a computing device **110** may include, without limitation, desktops, notebooks, laptops, phones, tablets, computer workstations, next generation portable devices, handheld computers, or some other computing system and/or device. Examples of display device technologies may include, without limitation, cathode ray tube display, light-emitting diode display, electroluminescent display, electronic paper, plasma display panel, liquid crystal display, high-performance addressing display, thin-film transistor display, organic light-emitting diode display, surface-conduction electron-emitter display, laser TV, carbon nanotubes, quantum dot display, interferometric modulator display, and the like.

[0032] The SU device **120** may be any hardware that includes a central processing unit **102** and a memory **103** and manages the software packages for the connected device **101** via, e.g., Over-The-Air (OTA) or Firmware Over-The-Air (FOTA) processes. OTA and FOTA processes generally include distributing new software updates, configuration settings, and updated encryption keys to the connected device **101** wirelessly or directly "over the air" (e.g., utilizing wireless mechanisms to send provisioning data or update packages for firmware or software updates to computing systems and/or devices).

[0033] For example, the SU device **120** may utilize Device Software Update via the OTA programming that implements the Open Mobile Alliance Device Management protocol, the TR-069 protocol, or a push notification service (e.g., Google Cloud Messaging or Apple Push Notification) to "push out" software packages, which may be initiated via a network **140** or user, to ensure that the connected devices **101** have the latest software improvements.

[0034] Alternatively, the SU device **120** may directly communicate with the cloud device **130**, the extended interface application, and/or a web portal to leverage existing communication channels between the SU device **120**, the cloud device **130**, and other devices **101**, **110**. Therefore, the SU device **120** may provide a central location for pushing updates and/or software packages to all the connected devices **101** on the network **140**.

[0035] The cloud device **130** may be any hardware that includes a central processing unit **102** and a memory **103** and manages the communications (e.g., software update available and response indications) between the connected device **101** and the computing device **110**. In general, when a computing device **110** is not within a radio range (as described below) of the connected device **101**, the cloud device **130** may communicate (see Arrows B, C) indications between the connected device **101** and the computing device **110**. The cloud device **130** may also include the extended interface application for access by a web portal of the computing device **110**. Therefore, the cloud device **130** provides a central location for receiving and transferring communications to all the connected devices **101** on the network **140**.

[0036] Further, the SU device **120** and the cloud device **130** may be servers. In general, a server may be any computing system and/or device (as described above) acting as databases, data repositories or other data stores that includes any type of data source and/or file system that operates to acquire the installation consent in support the SU experiences, alerts, and interactions. For instance, data sources may include data management client, along with licenses (e.g., license the permit control and access to the device by third parties platforms) relating to a data management access and configurations and/or device operability.

[0037] A device management client may include executable instructions that manage the connected device **101** and/or computing device **110** by setting configurations and diagnostics based on a particular protocol. Device management clients generally manage via provisioning, configuring, fault managing, and upgrading operations. Provisioning is the enabling and disabling of both physical device components and software components. Configuring is the changing of settings and/or parameters of the device. Fault managing is the monitoring and (sometimes) correcting of errors generated by the physical and software components.

[0038] Further, databases, data repositories or other data stores (e.g., the SU device **120** and the cloud device **130**) described herein may generally include various kinds of mechanisms for storing, providing, accessing, and retrieving various kinds of data, including a hierarchical database, a set of files in a file system, an application database in a proprietary format, a relational database management system (RDBMS), etc. Each such data store may generally be included within or external to a computing system and/or device (e.g., the SU device **120** and the cloud device **130**) employing a computer operating system such as one of those mentioned above, and/or accessed via a network (e.g., network **140**) or connection in any one or more of a variety of manners. A file system may be accessible from a computer operating system, and may include files stored in various formats. An RDBMS generally employs the Structured Query Language (SQL) in addition to a language for creating,

storing, editing, and executing stored procedures, such as the PL/SQL language mentioned above.

[0039] A network **140** may provide the infrastructure through which the devices **101**, **110**, **120**, **130** communicate. In general, a network (e.g., network **140**) may be a collection of computers and other hardware to provide infrastructure to establish virtual connections and carry communications. For instance, a network may be an infrastructure that generally includes edge, distribution, and core devices (e.g., tower **141** or network devices **142**) and enables a path (e.g., connections **147**, **148**, **149**) for the exchange of information between different devices and systems (e.g., between the devices **101**, **110**, **120**, **130**). Further, a network may be any conventional networking technology, and may, in general, be any packet network (e.g., any of a cellular network, global area network, wireless local area networks, wide area networks, local area networks, or combinations thereof, but may not be limited thereto) that provides the protocol infrastructure to carry communications. The network **140** is representative, and thus while a single cloud illustrates the network **140**, this illustration may represent a single network, a combination of different networks components and technologies, and/or a plurality of networks, as described above.

[0040] FIG. **1**B illustrates exemplary infrastructure components that support the communication operations between the devices **101**, **110**, **120**, **130** of FIG. **1**A (note that items that have been previously discussed may be utilized to denote the same or similar items in subsequent figures). The exemplary infrastructure components may include towers **141**, network devices **142**, transceivers **143**, **144**, and connections **147**, **148**, **149**. Additionally, FIG. **1**B includes computing devices **110.1** and **110.2** to illustrate the different exemplary communication operations.

[0041] The towers **141** may be tall structures designed to support antennas or aerials for telecommunications amongst the exemplary system **100**. The tower **141** may enable the connections **147** that carry signals to or from the network **140** (e.g., the connection **147**.A from the network **140** via the tower **141**.A to the connection **147**.AB via the transceiver **143** of the connected device **101**, and the connection **147**.BC from the network **140** via the tower **141**.B to either the connection **147**.AB via the transceiver **143** of the connected device **101** or the connection **147**.C via the transceiver **143** of the computing device **110.1**).

[0042] The network device **142** may be a computing system and/or device as described above that is a gateway between connection **148** and the network **140** to complete a communication path (e.g., Arrow C of FIG. **1**) between the computing device **110.2** and the devices **120**, **130** of the network **140**.

[0043] The transceivers **143**, **144**, may be any connector used for digital or analog signal transfers. For instance, the transceivers **143** may be any antenna technology, such as cellular, Wi-Fi, or the like, that implements a wireless exchange of data by converting propagating electromagnetic waves to and from conducted electrical signals. For example, the transceivers **143** may be an antenna technology that implements radio technology, such as Wi-Fi, near field communication, Bluetooth®, or the like, which is used to exchange data wirelessly using radio waves over a range that enables communication. Therefore, the connected device **101** may communicate with the computing device **110.1** either directly or through the cloud device **130**, based on a need of the exemplary system **100**.

[0044] The connections **147**, **148**, **149** may be wired or wireless connections between two endpoints (devices or systems) that carry electrical signals that facilitate virtual connections. Examples of connections **147**, **148**, **149** may be any transmission media including radio waves, metal wire, fiber optics, and the like. Virtual connections are comprised of the protocol infrastructure that enables communication (see Arrows A-D) to and from devices **101**, **110**, **120**, **130**. For instance, connections **147** may be wireless connections between the towers **141** and the transceivers **143** of the connected device **101** and the computing device **110.1**; connection **148** may be a wired connections between the computing device **110.2** and network device **142**; and connection **149** may be a wireless connection using radio waves over a radio range between the transceivers **144** of the connected device **101** and the computing device **110.1**. Further, the combination of connections **147**, **148**, **149** support the virtual connections of the exemplary system **100**.

[0045] The computing devices **110.1** and **110.2** are examples of the computing device **110** of FIG. **1**, with the computing device **110.1** being a smartphone and the computing device **110.2** being a desktop. The memory **103** of both computing devices **110.1** and **110.2** stores an extended interface application (e.g., extended interface application **210** of FIG. **2** described below), which may be utilized by the respective processor **102** to generate user interfaces to acquire the installation consent. The extended interface application will now be described with reference to the exemplary schematic of FIG. **2**.

[0046] FIG. **2** illustrates an extended interface application **210** stored on a memory **130** of a computing device **110** or cloud device (as illustrated by the dashed-box). The extended interface application **210** includes an application module **211**, an interface module **215** that generates user interfaces **216**, and a management module **218**. Although one modular breakdown of the extended interface application **210** is offered, it should be understood that the same functionality may be provided using fewer, greater, or differently named modules. Further, although it is not shown, the interface module **215** and the application module **218** may be integrated with any of the above named modules. Also, as another alternative example, the operability of the extended interface application **210** may be divided between the devices **101**, **110**, **120**, **130**, where modules **211**, **215**, **218** may be located separately on different devices and accessed through distributed computing, such that the operability is provided for, shared, and relied upon by other devices. Finally, a single computing device may be independently configured to include the entire operability of the extended interface application **210**, as illustrated in FIG. **2**.

[0047] The extended interface application **210** may generally be operated by the computing device **110** and/or cloud device **130**. For instance, the application module may receive and forward indications from the devices **101**, **120**, **130** of the exemplary system **100** to the management module **218**. The management module **218** may process these indications to support the generation of user interfaces **216** by the interface module **215**, which may provide notifications to (as described below) and receive inputs from (e.g., installation consent) the user or third party. For example, the user interfaces **216** may receive inputs that initiate indications (e.g., a user initiated operation), which when sent by the application module **211** trigger the installation of the software package on the connected device **101**.

[0048] In an exemplary operation, the extended interface application **210** may notify a user (e.g., via the user interfaces **216** of the computing device **110** or a web portal accessing the user interfaces **216** of the cloud device **130**) as soon as extended interface application **210** receives an update available indication from the connected device **101**. The extended interface application **210** may clearly present to the user that the update available indication is a software package for the connected device **101** and not a software update for the extended interface application **210**. When user responds to the update available indication (e.g., the extended interface application **210** receives an input), the extended interface application **210** may immediately send the response, as a response indication, back to the connected device **101**. If the extended interface application **210** is not active or the web portal is not open when the connected device **101** sends the update available indication to the extended interface application **210**, the notification may be presented to the user as soon as the extended interface application **210** or the web portal connects.

[0049] The application module **211** may include a set of executable instructions configured to facilitate communication between the sub-modules of the extended interface application **210** and hardware/software components external to the extended interface application **210**, including devices **101**, **110**, **120**, **130**. That is, the application module **211** may be configured to communicate directly with other applications, modules, models, devices, systems, and other sources through both physical and virtual interfaces. Further, the application module **211** may include executable instructions and specifications for routines, data structures, object classes, and variables that receive, package, present, and transfer data through a connection or over a network **140**, as further described below. For example, the application module **211** may be configured to receive instructions from the interface module **215** or sources external to the computing device **110** and, based on those instructions, forwards the instructions to the management module **218**. The application module **211** may also manage the dispatching and receipt of information along with integrating the extended interface application **210** with other applications and drivers, as needed per operating system.

[0050] The interface module **215** may include a set of executable instructions for generating and managing user interfaces **216**, which based on a received input, authorize the installation of the software package on the connected device **101**. For instance, the interface module **215** may be configured to generate, present, and provide one or more user interfaces **216** (e.g., in a menu, icon, tabular, map, pop-up, or grid format) in connection with other modules for presenting information and receiving inputs (e.g., indications of acceptance, deference, or rejection of the software package and/or configuration adjustments altering, updating, or changing the device settings). The inputs received by the user interfaces **216** may generally be communicated by interface module **215** to the application module **211**, which in turn forwards the inputs to the management module **218** for processing.

[0051] User interfaces **216** may include notifications such as banners, icons, badges, alerts, sounds, text, or any combinations thereof. A banner may be a media or drop-down menu that extends from a top portion of an interface, a sub-interface, and/or display of a computing device **110** and that may include text, badges, and animated symbols. An icon and/or a badge may be a number or symbol that signals a link, an event, or a number of events. An alert may be a pop-up window that may be centered on the display and that may include text, badges, and animated symbols.

[0052] One example of a user interface **216** may include a presentation of an 'Update Notification' alert when notifying a user or third party of an available software package: "This software update includes enhancements to your [Make] [Model]. The update will take about [X] minutes," where [Make] is the manufacturer of the device, [Model] is the model name of the device at sale, and [X] is the expected maximum update time in minutes. The 'Update Notification' alert may also include selectable option, such as "Install Now," "Install Later," and "No Thanks" buttons.

[0053] Another example of a user interface **216** may include a presentation of a '15th Day Deferral Notification' alert when the connected device **101** does not receive installation consent within fourteen days of the initial update available indication: "This software update includes enhancements to your [Make] [Model]. The update will take about [X] minutes. If no action is taken, the installation will start automatically after [Y minutes]," where [Y minutes] is the expected countdown timer when the installation will automatically start if no action is taken. The '15th Day Deferral Notification' alert may also include the selectable option, such as an "Install Now" button.

[0054] Other examples of user interfaces **216** may include a presentation of an 'Update in Progress Notification' alert during software package installation (e.g., "This software update for your [Make] [Model] is in progress," along with a selectable "OK" button and a progress bar); a 'Successful Update Notification' alert after a successful software package installation (e.g., "Your [Make] [Model] was updated successfully," along with a selectable "OK" button that clears this notification); and an 'Unsuccessful Update Notification' alert after an unsuccessful software package installation (e.g., "There was a problem updating your <Make> <Model>. No changes were made," along with a selectable "OK" button that clears this notification).

[0055] The interface module **215** may further generate new and unique interfaces particular to the extended interface application **210**. The interface module **215** may also commandeer or utilize interface formatting local to the device in which the extended interface application **210** is stored thereon (e.g., appropriating interfaces of the computing device **110** or web portal interfaces for providing notifications and receiving inputs). The interface module **215** may thus generate or utilize local, terminal, web-based, and mobile interfaces and any similar interface that presents and receives information relative to the connected device **101**.

[0056] The management module **218** may include a set of executable instructions configured to generate and process indications. The management module **218** may also make determinations as to whether the indications are initiated by the network **140** (e.g., operation initiates from a source other than input) or a user (e.g., operation initiates from an input). For instance, the management module **218** is configured to receive software update available indications through the application module **211**, e.g., from the cloud device **130** (see Arrow C) or the connecting device **101** (see Arrow D). Further, the management module **218** may send instructions to the interface module **215** via the application module **211** to generate user interfaces **216** that provide update or update available notifications. In turn, the management module **218** may receive and process inputs communicated by interface

module **215** via the application module **211** to determine if a user or third party has indicated acceptance, deferral, or rejection of the software package. Based on the input, the management module **218** generates and forwards a response indication through the application module **211** to the cloud device **130** (see Arrow C) or the connecting device **101** (see Arrow D).

[0057] Communication operations of the above exemplary system **100** and extended interface application **210** will now be described with reference to the exemplary process flows of FIGS. **3-5**. While the exemplary process flows are shown in the FIGS. **3-5**, these flows are not intended to be limiting. Indeed, additional or alternative flows and/or implementations may be used.

[0058] The following sample flows describe the SU experiences, alerts, and interactions that related to a network initiated software update operation and a user initiated software update operation. Both the network and user initiated software update operations may be associated with a package severity, such as a mandatory or an optional severity. Mandatory package severity ("mandatory severity") is a software package designation set by the SU device **120** indicating that a particular software package must be installed on the connected device. In turn, a software package with a mandatory severity may be accepted or deferred but not rejected. Optional package severity ("optional severity") is a software package designation set by the SU device **120** indicating that a particular software package may be installed on the connected device, and thus a software package with an optional severity may be accepted, deferred, or rejected.

[0059] In FIGS. **3-5**, communication operations between the SU device **120** and the connected device **110** are designated as 'A' operations in relationship to Arrow A of FIG. **1**A; communication operations between the connected device **110** and the cloud device are further designated as 'B' operations in relationship to Arrow B of FIG. **1**A; and communication operations between the cloud device and the extended interface application **210** are further designated as 'C' operations in relationship to Arrow C of FIG. **1**A.

[0060] FIG. **3** illustrates an exemplary process flow regarding a network initiated operation relating to a mandatory severity software package. In the case of FIG. **3**, the network initiated operation is a software package update pushed (and thus initiated) by the SU device **120** to connected devices.

[0061] In FIG. **3**, the SU device **120** may inform **301** the connected device **101** that a software package is available to download, which may be carried out by scheduled device management sessions, software update requests, and/or software update notifications between the SU device **120** and the connected device **101**. When available, the connected device **110** downloads **302** (as indicated by the ellipse in FIG. **3**) the software package from the SU device **120**.

[0062] After the connected device **101** completes the download of the software package, the connected device **101** sends **303** a device software update available indication to the cloud device **130**. The cloud device **130** in turn forwards **304** the device software update available indication to the extended interface application **210**.

[0063] The extended interface application **210** processes the indication to generate or provide **305** a device software update notification that informs the user **350** (or third party) that the software package has been downloaded and is ready to be installed on the connected device **101**. For example, the extended interface application **210** may generate a local user interface **216** that presents the notification or may provide the notification to a web portal being utilized by a user **350**. The extended interface application **210** may also generate the device software update notification to include the expected maximum update time in minutes, which may be predetermined by the SU device **120** (such as the 'Update Notification' described above). Further, since the software package is of a mandatory severity, the input may include the selectable options of: "Install Now" (accept) and "Install Later" (defer).

[0064] The extended interface application **210** then receives **306** an input from the user **350** via the user interface **216** or web portal. The input may indicate the selection of "Install Now" (accept) and "Install Later" (defer) by the user **350**. The extended interface application **210** processes the input to generate a response indication that reflects the selection by the user **350**. The extended interface application **210** then sends **307** the response indication to the cloud device **130**, which in turn forwards **308** the response indication to the connected device **101**. If the device software update notification is not responded to before powering off the computing device **110**, the computing device **110** at next power up may display the 'Update Notification' alert with one selectable option: "Install Now."

[0065] Next, the connected device **101** will either determine to immediately install the software package, when there is an 'Accept' indication—as illustrated, or defer installation to a later time, when there is a 'Defer' indication—as illustrated, based on processing the response indication received from the cloud device **130**. Note that while a communication (**308**) in FIG. **3** splits into multiple paths that are received by multiple blocks, the splitting is merely illustrative.

[0066] If the response indication identifies **309***a* that the user **350** selected to 'Accept' the software package installation ("Install Now"), then the connected device **101** performs **310** (proceed') the installation. During the software package installation, the connected device **101** may communicate the progress of the installation to the extended interface application **210**. In turn, the extended interface application **210** may present via the interface module **215** the 'Update in Progress Notification' alert described above.

[0067] If the response indication identifies **309***b* that the user **350** selected to 'Defer' the software package installation ("Install Later"), then the connected device **101** pauses (wait') for a predetermined time to send **303** a subsequent device software update available indication to the cloud device **130**. The predetermined time may be a maximum of 24 hours after the user **350** selected to defer the software package installation. The resulting subsequent device software update notification may be a reminder that a software package with a mandatory severity is awaiting installation consent.

[0068] If the connected device **101** does not receive installation consent within fourteen days of the initial device software update available indication, then on the fifteenth day the connected device **101** may initiate the presentation of a '15th Day Deferral Notification' alert by the extended interface application **210** as described above. If the '15th Day Deferral Notification' alert is not responded to within a specified amount time of receipt of notice, the connected device **101** may initiate presentation an 'Update in Progress Notification' alert by the extended interface application **210** to the user **350** while the connected device **101** automatically proceeds with the software package update.

[0069] Based on the success or failure of the installation, the connected device **101** forwards software update status

indications to the SU device **120** (see **311***a*) and the cloud device **130** (see **311***b*). Additionally, the connected device **101** may notify the SU device **120** when there is a deferral of the software package update via the software update status indications (see **311***a*).

[0070] After receipt, the cloud device **130** forwards **312** the software update status indication to the extended interface application **210**. The extended interface application **210** processes the indication to generate or provide **313***a* software update status notification that informs the user **350** of the software package status (e.g., whether installation was successful or unsuccessful). For example, the extended interface application **210** may generate a 'Successful Update Notification' alert after a successful software package update or an 'Unsuccessful Update Notification' alert when a software package update was unsuccessful, as described above. The extended interface application **210** then receives **314** an input from the user **350** via the user interface **216** or web portal. The input may indicate the selection of an "OK" button by the user **350** (e.g., acknowledge of the software package status), which in turn clears the software update status notification.

[0071] FIG. **4** illustrates an exemplary process flow regarding a network initiated operation relating to an optional severity software package. In FIG. **4**, the SU device **120** may inform **401** the connected device **101** that a software package is available to download, which may be carried out by scheduled device management sessions, software update requests, and/or software update notifications between the SU device **120** and the connected device **101**. The connected device **101** sends **402** a device software download and update available indication to the cloud device **130**. The cloud device **130** in turn forwards **403** the indication to the extended interface application **210**.

[0072] The extended interface application **210** processes the indication to generate or provide **404** a device software download and update available notification that informs the user **350** (or third party) that the software package may be downloaded to and installed on the connected device **101**. The device software download and update available notification may include the selectable options of "Install Now" (accept), "Install Later" (defer), and "No Thanks" (reject), since the software package is of an optional severity.

[0073] Next, the extended interface application **210** receives **405** an input. The input may indicate the selection of "Install Now" (accept), "Install Later" (defer), or "No Thanks" (reject) by the user **350**. The extended interface application **210** then processes the input to generate or provide a response indication. The extended interface application **210** then sends **406** the response indication the cloud device **130**, which in turn forwards **407** the response indication to the connected device **101**. Similarly to the software package with a mandatory severity, if the device software download and update available notification is not responded to before powering off the computing device **110**, the computing device **110** at next power up may display the 'Update Notification' alert with the selectable option of "Install Now."

[0074] Next, the connected device **101** will either determine to immediately install the software package, when there is an 'Accept' indication—as illustrated; defer installation to a later time, when there is a 'Defer' indication—as illustrated; or not install the software package when there a 'Reject' indication—as illustrated, based on processing the response indication received from the cloud device **130**. Note that while a communication (**407**) in FIG. **4** splits into multiple paths that are received by multiple blocks, the splitting is merely illustrative.

[0075] If the response indication identifies **408***a* that the user **350** selected to 'Accept' the software package installation ("Install Now"), then the connected device **101** forwards **409***a* an input request to the SU device **120** to execute a software update and device management session **409***b* that enables the connected device **101** to download **410** and install the software package. During the software package installation, the connected device **101** may initiate presentation the 'Update in Progress Notification' alert described above. Next, based on the success or failure of the installation, the connected device **101** forwards software update status indications to the SU device **120** (see **411***a*) and the cloud device **130** (see **411***b*).

[0076] If the response indication identifies **408***b* that the user **350** selected to 'Defer' the software package installation ("Install Later"), then the connected device **101** pauses (wait') for a predetermined time to send **402** a subsequent device software download and update available indication to the cloud device **130**. The predetermined time may similarly be a maximum of 24 hours after the user **350** selected to defer the software package installation. The resulting subsequent device software download and update available notification may be a reminder that a software package with an optional severity is awaiting download and installation consent. Further, the connected device **101** may notify (see **411***a*) the SU device **120** when there is a deferral of the software package update via a software update status indication.

[0077] If the response indication identifies **408***c* that the user **350** selected to 'Reject' the software package installation ("No Thanks"), then the connected device **101** forwards (send') a software update status indication to the SU device **120** and terminates the process flow of FIG. **4**.

[0078] In the case of immediate installation (see **408***a*, **409***a*, **409***b*, **410**) and after receipt of the software update status indication (**411***b*), the cloud device **130** forwards **412** the indication to the extended interface application **210**. The extended interface application **210** processes the indication to generate or provide **413** a software update status notification that informs the user **350** of the software package status (e.g., whether installation was successful or unsuccessful as described above). The extended interface application **210** then receives **414** an input from the user **350** via the user interface **216** or web portal. The input may indicate the selection of an "OK" button by the user **350** (e.g., acknowledge of the software package status), which in turn clears the software update status notification.

[0079] FIG. **5** illustrates an exemplary process flow regarding a user initiated operation relating to a mandatory or optional severity software package. In the case of FIG. **5**, the user initiated operation is a software package update pushed by the SU device **120** to connected devices based on a request from (and thus initiated by) a user.

[0080] In FIG. **5**, the extended interface application **210** may receive **501** an input from the user **350** via the user interface **216** or web portal a user **350**. The input may indicate a request to check for the status of new software packages for the connected device **101**. The extended interface application **210** may in turn process the input to generate and forward **502** a software status update check indication to the cloud device **130**. Upon receipt, the cloud device **130** may further forward **503** the indication to the connected device **110**. The con-

nected device **101** may then communicate with (e.g., send a software update request to) the SU device **120** to acquire **504** a software package status (e.g., via a device management session and/or software update notification between the SU device **120** and the connected device **101**).

[0081] The connected device **101** based on the software package status sends **505** a device software download and update available indication to the cloud device **130**, without downloading the software package from the SU device **120**. The cloud device **130** in turn forwards **506** the indication to the extended interface application **210**.

[0082] The extended interface application **210** processes the indication to generate or provide **507** a device software download and update available notification that informs the user **350** (or third party) whether the software package status indication **411** a is available for downloading to and installing on the connected device **101**. When the software package is available, the notification may include at least the selectable options of "Install Now" (accept) and "Install Later" (defer). If the software package is of an optional severity, then the notification may also include the selectable option of "No Thanks" (reject).

[0083] Next, the extended interface application **210** receives **508** an input from the user **350** via the user interface **216** or web portal. The input may indicate the selection of "Install Now" (accept), "Install Later" (defer), or "No Thanks" (reject) by the user **350**. The extended interface application **210** then processes the input to generate or provide a response indication. The extended interface application **210** then sends **509** the response indication to the cloud device **130**, which in turn forwards **510** the response indication to the connected device **101**.

[0084] Next, the connected device **101** will either determine to immediately install the software package, when there is an 'Accept' indication—as illustrated; defer installation to a later time, when there is a 'Defer' indication—as illustrated; or not install the software package, when there a 'Reject' indication—as illustrated, based on processing the response indication received from the cloud device **130**. Note that while a communication (**510**) in FIG. **5** splits into multiple paths that are received by multiple blocks, the splitting is merely illustrative.

[0085] If the response indication identifies **511***a* that the user **350** selected to 'Accept' the software package installation ("Install Now"), then the connected device **101** forwards **511***d* an input request to the SU device **120** to execute a software update and device management session **511***e* that enables the connected device **101** to download **112** and install the software package. During the software package installation, the connected device **101** may initiate presentation the 'Update in Progress Notification' alert described above. Next, based on the success or failure of the installation, the connected device **101** forwards software update status indications to the SU device **120** (see **513***a*) and the cloud device **130** (see **513***b*).

[0086] If the response indication identifies **511***b* that the user **350** selected to 'Defer' the software package installation ("Install Later"), then the connected device **101** pauses (wait') for a predetermined time to send **505** a subsequent device software download and update available indication to the cloud device **130**. The predetermined time may similarly be a maximum of 24 hours after the user **350** selected to defer the software package installation. The resulting subsequent device software download and update available notification may be a reminder that a software package with a mandatory or an optional severity is awaiting download and installation consent. Further, the connected device **101** may notify (see **513***a*) the SU device **120** when there is a deferral of the software package update via a software update status indication.

[0087] If the response indication identifies **511***c* that the user **350** selected to 'Reject' the software package installation ("No Thanks"), then the connected device **101** forwards (send') a software update status indication **513***a* to the SU device **120** and terminates the process flow of FIG. **5**.

[0088] In the case of immediate installation (see **511***a*, **511***d*, **512**) and after receipt of the software update status indication (**513***b*), the cloud device **130** forwards **514** the software update status indication to the extended interface application **210**. The extended interface application **210** processes the indication to generate or provide **515** a software update status notification that informs the user **350** of the software package status (e.g., whether installation was successful or unsuccessful as described above). The extended interface application **210** then receives **516** an input from the user **350** via the user interface **216** or web portal. The input may indicate the selection of an "OK" button by the user **350** (e.g., acknowledge of the software package status), which in turn clears the software update status notification.

[0089] Thus, the above system and method avoids unannounced software updates by acquiring installation consent through flexibility of software package indications/notifications and based on configurability of the connected device **101**, computing device **110**, the SU device **120**, the cloud device **130**, the need of the user **350** (or authorized third party), and specific vertical needs of the system and method. That is, the system and method avoids unannounced software updates by acquiring installation consent by a user **350** through the communication of the connected devices without displays **101** with computing devices with displays **110**.

[0090] With regard to the processes, systems, methods, heuristics, etc. described herein, it should be understood that, although the steps of such processes, etc. have been described as occurring according to a certain ordered sequence, such processes could be practiced with the described steps performed in an order other than the order described herein. It further should be understood that certain steps could be performed simultaneously, that other steps could be added, or that certain steps described herein could be omitted. In other words, the descriptions of processes herein are provided for the purpose of illustrating certain embodiments, and should in no way be construed so as to limit the claims.

[0091] Accordingly, it is to be understood that the above description is intended to be illustrative and not restrictive. Many embodiments and applications other than the examples provided would be apparent upon reading the above description. The scope should be determined, not with reference to the above description or Abstract below, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. It is anticipated and intended that future developments will occur in the technologies discussed herein, and that the disclosed systems and methods will be incorporated into such future embodiments. In sum, it should be understood that the application is capable of modification and variation.

[0092] All terms used in the claims are intended to be given their broadest reasonable constructions and their ordinary meanings as understood by those knowledgeable in the tech-

nologies described herein unless an explicit indication to the contrary in made herein. In particular, use of the singular articles such as "a," "the," "said," etc. should be read to recite one or more of the indicated elements unless a claim recites an explicit limitation to the contrary.

1. A system, comprising:

a first device storing an application, the application being executable by a processor of the first device to provide operations comprising:

sending a software package indication to a different device that instructs the different device to generate a notification;

receiving a response indication based on an input responsive to the notification from the second device; and

determining whether to proceed with an installation of a software package on the first device in accordance with the response indication.

2. The system of claim **1**, wherein the software package indication instructs the different device to generate the notification to include accept and defer options.

3. The system of claim **2**, wherein the notification further includes a reject option when the software package indication identifies that the software package is of an optional severity.

4. The system of claim **1**, wherein the operations further comprise:

proceeding with the installation of the software package when the response indication is determined to indicate that the input was a selection of an accept option.

5. The system of claim **1**, wherein the operations further comprise:

stopping the installation of the software package when the response indication is determined to indicate that the input was a selection of a defer option.

6. The system of claim **5**, wherein the operations further comprise:

sending a subsequent software package indication to the different device after a predetermined amount of time that instructs the different device to generate a second notification.

7. The system of claim **6**, wherein the operations further comprise:

receiving a second response indication based on a second input responsive to the second notification from the different device; and

proceeding with installation of the software package when the second response indication is determined to indicate that the second input was a selection of an accept option.

8. The system of claim **1**, further comprising:

a second device as the different device, where the second device is a computing device that stores an extended interface application that generates the notification; and

wherein the first device is a connected device without a display.

9. A system, comprising:

a first device storing an application, the application being executable by a processor of the first device to provide operations including:

receiving a software package indication;

generating a notification based on the software package indication;

receiving an input responsive to the notification; and

generating a response indication based on the input.

10. The system of claim **9**, wherein generating the notification based on the software package indication comprises generating the notification to include accept and defer options for an installation of a software package on a different device.

11. The system of claim **10**, wherein the notification further includes a reject option when the software package indication identifies that the software package is of an optional severity.

12. The system of claim **9**, wherein the response indication instructs an installation of a software package on a different device to initiate when the input indicates a selection of an accept option.

13. The system of claim **9**, wherein the response indication instructs an installation of a software package on a different device to stop when the input indicates a selection of a defer option.

14. The system of claim **13**, wherein the operations further comprise:

receiving a subsequent software package indication from the different device after a predetermined amount of time; and

generating a second notification based on the subsequent software package indication.

15. The system of claim **14**, wherein the operations further comprise:

receiving a second input responsive to the second notification that indicates a selection of an accept option; and

sending a second response indication based on the second input that instructs the different device to initiate with the installation of the software package.

16. The system of claim **9**, further comprising:

a second device as the different device, where the second device is a connected device without a display; and

wherein the first device is a computing device that stores an extended interface application.

17. A system, comprising:

a first device storing a first application, the application being executable by a processor of the first device to provide operations including:

sending a software package indication to a second device,

receiving a response indication from the second device, and

determining whether to proceed with an installation of a software package on the first device in accordance with the response indication; and

the second device storing a second application, the second application being executable by a processor of the second device to provide operations including:

receiving the software package indication from the first device,

generating a notification based on the software package indication,

receiving an input responsive to the notification,

generating the response indication based on the input, and

sending the response indication to the first device.

18. The system of claim **17**, further comprises:

a third device configured to utilize a web portal to:

access the notification of the second device and

supply the input to the second device, and

wherein the first device is a connected device without a display,

wherein the second device is a computing device, and

wherein the second application is an extended interface application that generates the notification.

19. A method, comprising:

sending by a first device to a second device a software package indication;

generating by the second device a notification based on the software package indication;

receiving by the second device an input responsive to the notification;

sending by the second device to the first device a response indication based on the input; and

determining whether to proceed with an installation of a software package on the first device in accordance with the response indication.

20. The method of claim **19**, further comprises:

proceeding with the installation of the software package when the response indication is determined to indicate that the input was a selection of an accept option included in the notification.

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