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Title

USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES

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PROVISIONAL APPLICATION FOR UNITED STATES PATENT

USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES

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USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES

BACKGROUND OF THE INVENTION

[0001] With the advent of mass market digital communications and content distribution, many access networks such as wireless networks, cable networks and DSL (Digital Subscriber Line) networks are pressed for user capacity, with, for example, EVDO (Evolution-Data Optimized), HSPA (High Speed Packet Access), LTE (Long Term Evolution), WiMax (Worldwide Interoperability for Microwave Access), and Wi-Fi (Wireless Fidelity) wireless networks increasingly becoming user capacity constrained. Although wireless network capacity will increase with new higher capacity wireless radio access technologies, such as MIMO (Multiple-Input Multiple-Output), and with more frequency spectrum being deployed in the future, these capacity gains are likely to be less than what is required to meet growing digital networking demand.

[0002] Similarly, although wire line access networks, such as cable and DSL, can have higher average capacity per user, wire line user service consumption habits are trending toward very high bandwidth applications that can quickly consume the available capacity and degrade overall network service experience. Because some components of service provider costs go up with increasing bandwidth, this trend will also negatively impact service provider profits.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Various embodiments of the invention are disclosed in the following detailed description and the accompanying drawings.

[0004] **Figure 1** is a functional diagram illustrating a network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0005] **Figure 2A** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0006] **Figure 2B** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0007] **Figure 2C** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0008] **Figure 2D** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0009] **Figure 2E** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0010] **Figure 2F** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0011] **Figure 2G** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0012] **Figure 3** is a functional diagram illustrating a network architecture for an MVNO platform for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0013] **Figure 4A** is a functional diagram illustrating another network architecture for an MVNO platform for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0014] **Figure 4B** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments that includes a Customer Self Help Server and User Interface.

[0015] **Figure 4C** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments that includes a Customer Self Help Server and User Interface.

[0016] **Figure 4D** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments that includes a Customer Self Help Server and User Interface.

[0017] **Figure 5** is a functional diagram illustrating a user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0018] **Figure 6** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0019] **Figure 7** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0020] **Figure 8** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0021] **Figure 9** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0022] **Figure 10** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0023] **Figure 11** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0024] **Figure 12** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0025] **Figure 13** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0026] **Figure 14** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0027] **Figure 15** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0028] **Figure 16** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0029] **Figure 17** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0030] **Figure 18** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0031] **Figure 19** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0032] **Figure 20** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0033] **Figure 21** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0034] **Figure 22** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0035] **Figure 23** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0036] **Figure 24** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0037] **Figure 25** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0038] **Figure 26** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0039] **Figure 27** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0040] **Figure 28** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0041] **Figure 29** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0042] **Figure 30** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0043] **Figure 31** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0044] **Figure 32** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0045] **Figure 33** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0046] **Figure 34** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0047] **Figure 35** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0048] **Figure 36** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0049] **Figure 37** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0050] **Figures 38A-B** are functional diagrams for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0051] **Figure 39** is a functional diagram illustrating another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0052] **Figure 40** is a functional diagram for requesting user notifications for device assisted services (DAS) in accordance with some embodiments.

[0053] **Figure 41** is a functional diagram for a platform architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0054] **Figure 42** is a functional diagram for another platform architecture for user notifications for device assisted services (DAS) in accordance with some embodiments.

[0055] **Figure 43** is a flow diagram for user notifications for device assisted services (DAS) in accordance with some embodiments.

DETAILED DESCRIPTION

[0056] The invention can be implemented in numerous ways, including as a process; an apparatus; a system; a composition of matter; a computer program product embodied on a computer readable storage medium; and/or a processor, such as a processor configured to execute instructions stored on and/or provided by a memory coupled to the processor. In this specification, these implementations, or any other form that the invention may take, may be referred to as techniques. In general, the order of the steps of disclosed processes may be altered within the scope of the invention. Unless stated otherwise, a component such as a processor or a memory described as being configured to perform a task may be implemented as a general component that is temporarily configured to perform the task at a given time or a specific component that is manufactured to perform the task. As used herein, the term ‘processor’ refers to one or more devices, circuits, and/or processing cores configured to process data, such as computer program instructions.

[0057] A detailed description of one or more embodiments of the invention is provided below along with accompanying figures that illustrate the principles of the invention. The invention is described in connection with such embodiments, but the invention is not limited to any embodiment. The scope of the invention is limited only by the claims and the invention encompasses numerous alternatives, modifications and equivalents. Numerous specific details are set forth in the following description in order to provide a thorough understanding of the invention. These details are provided for the purpose of example and the invention may be practiced according to the claims without some or all of these specific details. For the purpose of clarity, technical material that is known in the technical fields related to the invention has not been described in detail so that the invention is not unnecessarily obscured.

[0058] With the development and increasing proliferation of mass market digital communications and content distribution, communication network capacity gains are being outpaced by growing digital networking demand. For example, some industry experts project average wireless device usage of four devices per subscriber, with a mixture of general purpose devices like smart phones and computers along with special purpose devices like music players, electronic readers, connected (e.g., networked) cameras and connected gaming devices. In

addition, wire line user service consumption habits are trending toward very high bandwidth applications that can quickly consume the available capacity and degrade overall network service experience if not efficiently managed. Because some components of service provider costs go up with increasing bandwidth, this trend will also negatively impact service provider profits.

[0059] There is a need for a communication system and method that provides for flexible service plans and management of user network services to provide consumer choice of more refined service plan offerings and efficient management of network capacity.

[0060] Also, it is becoming increasingly important to more deeply manage the level of services delivered to networked devices to provide cost effective services that match growing digital networking usage patterns. For example, access providers can move away from only billing for basic access and move toward billing for higher level service delivery with example services including rich Internet access and email, application based billing, content distribution, entertainment activities, information or content subscription or gaming. In addition, a growing number of new special purpose and general purpose networked devices are fueling demand for new service plans, for example, tailored to the new device usage models (e.g., a special service plan for an e-book reader device).

[0061] As network capabilities grow and new networked device offerings grow, access network service providers will realize increasing value in opening up their networks to allow innovation and expanded offerings for network service consumers. However, opening up the networks to provide efficient third party definition of alternative service and billing models requires more flexible service and billing policy management solutions. For example, machine to machine applications such as telemetry, surveillance, shipment tracking and two way power control systems are example new applications that would require new offerings to make such available to network service customers. The need to customize service offerings for these new applications requires more efficient methods for defining, testing and launching new services with more refined control of service functions and service costs. In some embodiments, this means billing for different types of service elements, such as total traffic, content downloads, application usage, information or content subscription services, people or asset tracking services, real time machine to machine information or electronic commerce transactions.

[0062] In some embodiments, network user capacity is increased and user service costs are reduced by managing and billing for service consumption in a more refined manner (e.g., to satisfy network neutrality requirements). By managing service consumption in a user friendly manner, the overall service capacity required to satisfy the user device needs can be tailored more closely to the needs of a given user thereby reducing user service costs and increasing service provider profits. For example, managing service usage while maintaining user satisfaction includes service usage policy implementation and policy management to identify, manage and bill for service usage categories, such as total traffic consumption, content downloads, application usage, information or content subscription services, electronic commerce transactions, people or asset tracking services or machine to machine networking services. As described herein, service activity is used to refer to any service usage or traffic usage that can be associated with, for example, an application; a network communication end point, such as an address, uniform resource locator (URL) or other identifier with which the device is communicating; a traffic content type; a transaction where content or other material, information or goods are transacted, purchased, reserved, ordered or exchanged; a download, upload or file transfer; email, text, SMS, IMS or other messaging activity or usage; VOIP services; video services; a device usage event that generates a billing event; service usage associated with a bill by account activity (also referred to as billing by account) as described herein; device location; device service usage patterns, device user interface (UI) discovery patterns, content usage patterns or other characterizations of device usage; or other categories of user or device activity that can be identified, monitored, recorded, reported, controlled or processed in accordance with a set of verifiable service control policies. As will be apparent to one of ordinary skill in the art in view of the embodiments described herein, some embodiments identify various service activities for the purpose of decomposing overall service usage into finer sub-categories of activities that can be verifiably monitored, categorized, cataloged, reported, controlled, monetized and used for end user notification in a manner that results in superior optimization of the service capabilities for various levels of service cost or for various types of devices or groups. In some embodiments, it will be apparent to one of ordinary skill in the art that the terms service activity or service usage are associated with categorizing and possibly monitoring or controlling data traffic, application usage, communication with certain network end points, or transactions, and it will also be apparent that in some embodiments, the term service activity is

intended to include one or more of the broader aspects listed above. The shortened term service usage can be used interchangeably with service activity, but neither term is intended in general to exclude any aspect of the other. In some cases, where the terms service usage or service activity are used, more specific descriptors such as traffic usage, application usage, website usage, and other service usage examples are also used to provide more specific examples or focus in on a particular element of the more encompassing terms.

[0063] Various techniques for providing user interface (UI) notifications for device assisted services (DAS), are disclosed in co-pending U.S. Patent Application No. 12/380,758 (Attorney Docket No. RALEP003), entitled VERIFIABLE DEVICE ASSISTED SERVICE USAGE MONITORING WITH REPORTING, SYNCHRONIZATION, AND NOTIFICATION, filed on March 2, 2009, published as U.S. Pub. App. No. 20100191612, co-pending U.S. Patent Application No. 12/695,020 (Attorney Docket No. RALEP024), entitled ADAPTIVE AMBIENT SERVICES, filed on January 27, 2010, published as U.S. Pub. App. No. 20100198698, co-pending U.S. Patent Application No. 12/694,451 (Attorney Docket No. RALEP026), entitled DEVICE GROUP PARTITIONS AND SETTLEMENT PLATFORM, filed on January 27, 2010, published as U.S. Pub. App. No. 20100197267, and co-pending U.S. Patent Application No. 12/695,021 (Attorney Docket No. RALEP029), entitled QUALITY OF SERVICES FOR DEVICE ASSISTED SERVICES, filed on January 27, 2010, published as U.S. Pub. App. No. 20100195503, which are incorporated herein by reference for all purposes.

[0064] In some embodiments, employing this level of service categorization and control is accomplished in a manner that satisfies user preferences. In some embodiments, employing this level of service categorization and control is accomplished in a manner that also satisfies government rules or regulations regarding open access, for example, network neutrality requirements. In some embodiments, service management solutions that also collect and/or report user or device service usage or service activity behavior to determine how best to meet the user's simultaneous desires for service quality and lower service costs are disclosed. For example, such monitoring and reporting are accomplished in a manner that includes approval by the user and in a manner that also protects the privacy of user information and service usage behavior or service activity history.

[0065] In some embodiments, a system and method is disclosed for increasing network user capacity for wireless networks in the face of increasing service demand per user by providing for a greater number of base stations, also sometimes referred to as access points, base terminals, terminal nodes or other well known acronyms, to be more easily and/or more cost effectively deployed. For example, to simplify the process of deploying base stations, the installation complexity and the network infrastructure required for the base station to obtain backhaul service to the various networks that users desire to connect with are reduced.

[0066] In some embodiments, dense base station deployments are simplified by reducing the requirement to aggregate or concentrate the base station traffic through a specific dedicated core network infrastructure, so that the base stations connect to the desired user networks through a more diverse set of local loop, back bone and core routing options. This approach also reduces network infrastructure equipment, installation and maintenance costs. In some embodiments, this is accomplished by distributing the network traffic policy implementation and control away from the core network by providing for more control for service policy implementation and management on the end user device and, in some embodiments, in the end user device with respect to certain service policies and the network (e.g., control plane servers) with respect to other service policies. For example, this approach facilitates connecting the base stations directly to the local loop Internet with a minimum of specific dedicated networking infrastructure.

[0067] In some embodiments, products that incorporate device assisted service policy implementation, network services and service profiles (e.g., a service profile includes a set of one or more service policy settings for the device for a service on the network) are disclosed, as described below. For example, aspects of the service policy (e.g., a set of policies/policy settings for the device for network services, typically referring to lower level settings, such as access control settings, traffic control settings, billing system settings, user notification settings, user privacy settings, user preference settings, authentication settings and admission control settings) that are moved out of the core network and into the end user device include, for example, certain lower level service policy implementations, service usage or service activity monitoring and reporting including, for example, privacy filtering, customer resource management monitoring and reporting including, for example, privacy filtering, adaptive service policy control, service

network access control services, service network authentication services, service network admission control services, service billing, transaction billing, simplified service activation and sign up, user service usage or service activity notification and service preference feedback and other service capabilities.

[0068] As discussed below, product designs that move certain aspects of one or more of these service profile or service policy implementation elements into the device provide several advantageous solutions to the needs described above. For example, benefits of certain embodiments include the ability to manage or bill for a richer and more varied set of network services, better manage overall network capacity, better manage end user access costs, simplify user or new device service activation, simplify development and deployment of new devices with new service plans (e.g., service profile and billing/costs information associated with that service profile), equip central service providers with more effective open access networks for new third party solutions, simplify the equipment and processes necessary to deploy wireless base stations and simplify the core networking equipment required to deploy certain access networks.

[0069] As discussed below, there are two network types that are discussed: a central provider network and a service provider network. The central provider network generally refers to the access network required to connect the device to other networks. The central provider network generally includes the physical layer, the Media Access Control (MAC) and the various networking functions that can be implemented to perform authentication, authorization and access control, and to route traffic to a network that connects to the control plane servers, as discussed below. The service provider network generally refers to the network that includes the control plane servers. In some embodiments, a central provider network and a service provider network are the same, and in some embodiments, they are different. In some embodiments, the owner or manager of the central provider network and the owner or manager of the service provider network are the same, and in some embodiments, they are different.

[0070] In some embodiments, control of the device service policies is accomplished with a set of service control plane servers that reside in the access network or any network that can be reached by the device. This server based control plane architecture provides for a highly efficient means of enabling third party control of services and billing, such as for central carrier

open development programs or Mobile Virtual Network Operator (MVNO) relationships. As device processing and memory capacity expands, moving to this distributed service policy processing architecture also becomes more efficient and economical. In some embodiments, several aspects of user privacy and desired network neutrality are provided by enabling user control of certain aspects of device based service usage or service activity reporting, traffic reporting, service policy control and customer resource management (CRM) reporting.

[0071] In many access networks, such as wireless access networks, bandwidth capacity is a valuable resource in the face of the increasing popularity of devices, applications and content types that consume more bandwidth. To maintain reasonable service profit margins, a typical present service provider practice is to charge enough per user for access to make service plans profitable for the higher bandwidth users. However, this is not an optimal situation for users who desire to pay less for lower bandwidth service usage or service activity scenarios.

[0072] Accordingly, in some embodiments, a range of service plan pricing can be enabled that also maintains service profitability for the service provider, for example, by providing a more refined set of management and control capabilities for service profiles. For example, this approach generally leads to service management or traffic shaping where certain aspects of a service are controlled down based on service policies to lower levels of quality of service. Generally, there are three problems that arise when these techniques are implemented. The first problem is maintaining user privacy preferences in the reporting of service usage or service activity required to set, manage or verify service policy implementation. This problem is solved in a variety of ways by the embodiments described below with a combination of user notification, preference feedback and approval for the level of traffic information the user is comfortable or approves and the ability to filter service usage or service activity, in some embodiments, specifically traffic usage or CRM reports so that only the level of information the user prefers to share is communicated. The second problem is satisfying network neutrality requirements in the way that traffic is shaped or services are managed. This problem is solved in a variety of ways as described in the embodiments described below by empowering the user to make the choices on how service usage, service activity, traffic usage or CRM data is managed down to control costs, including embodiments on user notification and service policy preference feedback. By allowing the user to decide how they want to spend and manage their service

allowance or resources, a more neutral or completely neutral approach to network usage can be maintained by the service provider. The third problem is to help the user have an acceptable and enjoyable service experience for the lower cost plans that will result in much wider scale adoption of connected devices and applications but are more constrained on service activity usage or options or bandwidth or traffic usage. As lower cost service plans are offered, including plans where the basic connection service may be free, these service plans will require service provider cost controls to maintain profitability or preserve network capacity that result in lower limits on service usage or service activity. These lower service usage or service activity limit plans will result in more users who are likely run over service usage limits and either experience service shutdown or service cost overages unless they are provided with more capable means for assistance on how to use and control usage for the lower cost services. This problem is solved in a variety of ways with a rich collection of embodiments on user notification, service usage and cost projection, user notification policy feedback, user service policy preference feedback, and adaptive traffic shaping or service policy implementation. As described herein, some embodiments allow a wide range of flexible and verifiable service plan and service profile implementations ranging from examples such as free ambient services that are perhaps sponsored by transaction revenues and/or bill by account sponsored service partner revenues, to intermediately priced plans for basic access services for mass market user devices or machine to machine communication devices, to more expensive plans with very high levels of service usage or service activity limits or no limits at all. Several bill by account embodiments also provide for the cataloging of service usage that is not a direct benefit to end users but is needed for basic maintenance of the device control channels and access network connection, so that the maintenance traffic service cost can be removed from the user billing or billed to non-user accounts used to track or account for such service costs. These embodiments and others result in a service usage or service activity control capability that provides more attractive device and service alternatives to end users while maintaining profitability for service providers and their partners.

[0073] In some embodiments, the above described various embodiments for device based service policy and/or service profile communications control are implemented using network based service control, for example, for satisfying various network neutrality and/or privacy requirements, based on indication(s) received from the device (e.g., user input provided using the

device UI using the service processor) and network based service control (e.g., using a DPI service monitor or DPC policy implementation and/or other network elements).

[0074] In some embodiments, a virtual network overlay includes a device service processor, a network service controller and a control plane communication link to manage various aspects of device based network service policy implementation. In some embodiments, the virtual network overlay networking solution is applied to an existing hierarchical network (e.g., for wireless services), and in some embodiments, is applied to simplify or flatten the network architecture as will be further described below. In some embodiments, the large majority of the complex data path network processing required to implement the richer service management objectives of existing hierarchical networks (e.g., for wireless services) are moved into the device, leaving less data path processing required in the edge network and in some cases even less in the core network. Because the control plane traffic between the service control servers and the device agents that implement service policies can be several orders of magnitude slower than the data plane traffic, service control server network placement and back-haul infrastructure is much less performance sensitive than the data plane network. In some embodiments, as described further below, this architecture can be overlaid onto all the important existing access network architectures used today. In some embodiments, this architecture can be employed to greatly simplify core access network routing and data plane traffic forwarding and management. For example, in the case of wireless networks, the incorporation of device assisted service policy implementation architectures can result in base stations that directly connect to the Internet local loop and the data traffic does not need to be concentrated into a dedicated core network. This results, for example, in a large reduction in backhaul cost, core network cost and maintenance cost. These cost savings can be re-deployed to purchase and install more base stations with smaller cells, which results in higher data capacity for the access network leading to better user experience, more useful applications and lower service costs. This flattened networking architecture also results in latency reduction as fewer routes are needed to move traffic through the Internet. In some embodiments, the present invention provides the necessary teaching to enable this powerful transformation of centralized network service architectures to a more distributed device based service architectures.

[0075] Device based billing can be compromised, hacked and/or spoofed in many different ways. Merely determining that billing reports are being received from the device, that the device agent software is present and properly configured (e.g., the billing agent is present and properly configured) is insufficient and easily spoofed (e.g., by spoofing the agent itself, providing spoofed billing reports using a spoofed billing agent or providing spoofed agent configurations). Accordingly, in some embodiments, verifiable device assisted and/or network based service policy implementation is provided. For example, verifiable service usage and/or service usage billing can be provided as described herein with respect to various embodiments.

[0076] While much of the below discussion and embodiments described below focus on paid service networks, those of ordinary skill in the art will appreciate that many of the embodiments also apply to other networks, such as enterprise networks. For example, the same device assisted network services that create access control services, ambient activation services and other service profiles can be used by corporate IT managers to create a controlled cost service policy network for corporate mobile devices. As another example, embodiments described below for providing end user service control can also allow a service provider to offer parental controls by providing parents with access to a website with a web page that controls the policy settings for the access control networking service for a child's device.

[0077] This application is a continuation in part of co-pending U.S. Patent Application No. 12/380,758 (Attorney Docket No. RALEP003), entitled VERIFIABLE DEVICE ASSISTED SERVICE USAGE MONITORING WITH REPORTING, SYNCHRONIZATION, AND NOTIFICATION, filed on March 2, 2009, published as U.S. Pub. App. No. 20100191612, which is incorporated herein by reference for all purposes.

[0078] Various embodiments for user notifications (e.g., user interface (UI) notifications) for device assisted services (DAS) are provided. In some embodiments, UI notifications for device assisted services includes a processor of a communications device configured to: monitor a network service usage activity based on a service policy for assisting control of the communications device use of a network service, in which the service policy includes one or more user notification settings based on use of the network service; determine whether the monitored network service usage activity requires a user notification based on the service policy

and based on a device based service usage measure; and generate the user notification, in which the device based service usage for the communications device is periodically synchronized with a network based service usage; and a memory of the communications device coupled to the processor and configured to provide the processor with instructions. In some embodiments, user notifications for device assisted services are implemented as a computer readable storage medium and/or a method performed on a communications device using a processor as described herein.

[0079] In some embodiments, the communications device is a mobile communications device, and the network service includes one or more Internet based services, and the mobile communications device includes one or more of the following: a mobile phone, a PDA, an eBook reader, a music device, an entertainment/gaming device, a computer, laptop, a net book, a home networking system, and a navigation system.

[0080] In some embodiments, user notification is a client driven user notification controlled by the communications device implementing the service policy, in which a service plan is associated with the communications device, and in which the monitored network service usage activity exceeds a limit associated with the service plan, the monitored network service usage activity is outside the service plan, and/or the monitored network service usage activity violates the service policy. In some embodiments, the service policy includes one or more of the following: user notification with acknowledgement settings, user notification with synchronized service usage information, user notification preference settings, and user privacy settings.

[0081] In some embodiments, UI notifications for device assisted services includes receiving a trigger event detection indication for user notification (e.g., the notification trigger event detector sends an indication that a notification trigger event has occurred, such as for a usage related user notification, and the trigger event detector can be implemented on the communications device and/or on a network element, and this function is referred to herein as a notification trigger event detector, and is referred to in the various figures as notification trigger event detect 138 or trigger detect 138), send a trigger event message to a user notification agent (e.g., a service processor notification agent), determine a user notification message based on the trigger event message (e.g., index the trigger event message using to a set of user notification message objects locally stored on the communications device (e.g., on a local memory or other

local storage and/or insertable storage element, such as a SIM) to select a stored user notification message object), and generate the determined user notification message (e.g., send the selected user notification message object to a user interface of the communications device).

[0082] In some embodiments, UI notifications for device assisted services includes: (a) using a notification trigger detector (e.g., trigger event detect 138 or trigger detect 138) to identify that a notification trigger event has occurred according to a pre-configured (e.g., pre-programmed, pre-stored, or provisioned) set of notification trigger event detection criteria for a wireless device, (b) generate a pre-configured (e.g., pre-provisioned, pre-programmed, or pre-stored) notification trigger index or notification trigger message that identifies the specific notification message sequence that is to be displayed on the device as a result of the occurrence of the notification trigger event, (c) send or route the notification trigger index or notification trigger message sequence to a notification agent on the device (e.g., notification agent 1697), and (d) based on receipt of the notification trigger index or trigger message the device notification agent executes a pre-configured set of ordered steps required to display a notification sequence message that corresponds to the notification trigger index or notification trigger message to the device UI, in which the notification message sequence information used in the display of the notification message sequence is obtained from one or more of: (i) any required message sequence information stored (e.g., provisioned or programmed) locally on the device (e.g., text and/or graphics information stored on the device that is used to display a portion or all of the notification message sequence stored in device notification message sequence store 1697A), (ii) information contained in the notification trigger message, and (iii) any required notification message sequence information stored (e.g., provisioned or programmed) on network elements (e.g., text and/or graphics information stored on one or more network elements that is used to display a portion or all of the notification message sequence).

[0083] In some embodiments, the notification trigger detector is implemented within a network element. For example, the notification trigger detector can be located within: a gateway or router (e.g., a home agent 6510, 4G/3G/2G transport gateways 420, 4G/3G/2G RAN gateways 410 as shown in the various figures herein); a real time reporting network element or a near-real-time reporting network element used to provide device service usage reports (e.g., a usage report, store 136 as shown in the various figures herein); another element in the network

device service usage reporting and charging system; or another element in the device data path traffic inspection and processing system.

[0084] In some embodiments, the notification trigger detector is implemented within a device agent. For example, the notification trigger detector can be implemented in a device service monitor agent (e.g., a service monitor agent 1696 as shown in the various figures herein); a device policy decision agent (e.g., a policy implementation agent 1690 as shown in the various figures herein); in an application program (e.g., a TCP application 1604 as shown in the various figures herein); or in another device agent or function with access to device application behavior and/or service usage information.

[0085] In some embodiments, a device notification agent is pre-configured to maintain a local device storage of one or more pre-determined sets of notification sequence information (e.g., in a notification message sequence store 1697A as shown in the various figures herein), each set defining at least a portion of the information required to generate a UI notification message sequence; the local storage of notification sequence information is organized so that a desired set of notification sequence information is indexed by a notification trigger index or notification trigger message; the notification agent receives the notification trigger index or notification trigger message from a notification trigger detection element; and the notification agent initiates (e.g., generates, assembles, executes, or manages) a complete notification message sequence by performing one or more of the following operations:

- a. initiate (e.g., generate, assemble, execute, or manage) a device notification message sequence by using the notification trigger index to look up a pre-stored set of message sequence information (e.g., after adding additional information or additional formatting, such as adding a UI background bitmap that is common to multiple notification message sequences);
- b. initiate a device notification message sequence by using the notification trigger message to look up a pre-stored set of message sequence information (e.g., notification information, UI bitmap, and/or UI formatting) and combining the pre-stored information with information included in the notification trigger message (e.g., usage count update, service plan usage condition or status, and/or specific

service usage activity information) to form a complete notification message sequence;

- c. initiate a device notification message sequence by using the notification trigger index or trigger message information as a reference to initiate a notification message sequence based on information stored on a network element, such as Network Based Notification Message Information 1697B (e.g., pull down a particular set of message sequence information from a server or initiate/redirect a user to a particular portal or website message sequence, such as a series of web pages with options); or
- d. perform a combination of two or more of the above operations; and the device notification agent communicates with a device UI to provide the notification message sequence to the device user.

[0086] For example, the notification agent can initiate a message sequence (e.g., launch a web site series of pages), generate a message or assemble a message (e.g., receive/request/retrieve information from various places on the device and/or network and assemble the text and graphics into a message sequence), or execute a message (e.g., use numbers to embed them into a more complex UI display object).

[0087] In some embodiments, the service usage notification trigger detection element is a network element. In some embodiments, the service usage notification trigger detection element is a device agent located on the device.

[0088] The programmable device user notification agent system described herein offers more flexible and comprehensive definitions for notification trigger event detection criteria and associated notification message sequence types and specific notification message sequences for wireless communication devices, such as mobile wireless devices. For example, using various embodiments described herein, a wide variety of notification trigger event detection criteria can be defined and provisioned, and a corresponding wide variety of associated notification message sequences (e.g., also referred to herein as notifications) can be defined and provisioned. In some embodiments, the user notification that is initiated by the notification trigger event (e.g., and

subsequent receipt of the notification trigger index or notification trigger message) includes, one or more of the following:

1. a notification that the monitored network service usage activity is out of policy based on the service policy;
2. an option to modify one or more service policy settings of the communications device;
3. a notification describing or offering user selection of a service plan change;
4. a notification acknowledgement in which the user is required to acknowledge that a service usage notification has been received by the user;
5. a notification acknowledgement of a service usage overage condition or service usage present or future cost condition;
6. a notification describing or offering user selection of a service plan upgrade or temporary allowance for a service usage activity (e.g., application (such as a browser, email program or web view, mapping or directions application or web view, audio application or web view, voice application or web view, chat application or web view, streaming music or video application or web view, ereader, gaming application or web view, calendar application or web view, contacts application or web view, social network application or web view, or other application programs or web views); network destination (such as a web site or server address); content type (such as http, web links to audio or video, ads, file downloads, picture files, video files or streaming, audio files, or streaming); traffic type, service type (such as data, video, audio, or voice); carrier sponsored service, third party sponsored service, or user paid service);
7. a notification describing or offering user selection of a service plan upgrade or temporary allowance for a service usage activity that is not covered or allowed with the current service plan policies;
8. a notification describing or offering user selection of an upgrade to the current service plan (e.g., including possibly no current paid service plan), a downgrade to the current service plan or a modification to the current service plan;

9. a notification describing or offering user selection of an upgrade to the current service plan (e.g., including possibly no current paid service plan), a downgrade to the current service plan or a modification to the current service plan based on a detected pattern of usage that indicates a more suitable service plan as compared to the current service plan is available;
10. a notification indicating or describing the current busy state or congestion state of the network connected to the device;
11. a notification that a service usage activity requires a given level of QoS that is either not part of the current service plan or is not available;
12. a notification that a service usage activity requires a given level of QoS that is either not part of the current service plan, and providing the user with an option to modify the service plan selection or user controlled service plan policies to include the required level of QoS to perform the service usage activity;
13. a notification indicating that a user service usage activity (e.g., a service usage activity initiated by a device user) is being limited based on background priority policies or QoS priority policies specified in the current service plan policy set (e.g., in which limited includes one or more of blocked, throttled, aggregated and held, delayed, or otherwise controlled or restricted);
14. a notification indicating that a user service usage activity is being limited based on background priority policies or QoS priority policies specified in the current service plan policy set, and providing the user with an option to over-ride the background policy;
15. a notification indicating that a device system activity or other non-user service usage activity (e.g., an OS service usage activity, a software update, an RSS feed, a service usage activity spawned by an application or widget, or an Ethernet message) is being limited based on background priority policies or QoS priority policies specified in the current service plan policy set;
16. a notification indicating that a device system activity or other non-user service usage activity is being limited based on background priority policies or QoS

priority policies specified in the current service plan policy set, and providing the user with an option to over-ride the background policy;

17. a notification regarding the current QoS availability of the network connected to the device;
18. a notification that a given service activity is not allowed; a notification that one or more service usage activities are not available or are not allowed for the present service plan at the present time, or for the present active network, or for a roaming network, or for the present network busy state or congestion state, or for the present QoS availability;
19. a notification that one or more service usage activities are not available or is not allowed for the present service plan at the present time, or for the present active network, or for a roaming network, or for the present network busy state or congestion state, or for the present QoS availability, and an associated offer to temporarily or permanently upgrade the service policy (e.g., service plan) capabilities to allow the one or more service usage activities;
20. a notification that one or more service usage activities are available or are allowed for the present service plan at the present time, or for the present active network, or for a roaming network, or for the present network busy state or congestion state, or for the present QoS availability;
21. a notification that one or more service usage activities are available or are allowed with a reduced access network performance (e.g., throttled, background service status, or certain level of QoS) for the present service plan at the present time, or for the present active network, or for a roaming network, or for the present network busy state or congestion state, or for the present QoS availability;
22. a notification that one or more service usage activities are available or are allowed with a reduced access network performance for the present service plan at the present time, or for the present active network, or for a roaming network, or for the present network busy state or congestion state, or for the present QoS availability, and an associated offer to temporarily or permanently upgrade the

service policy (e.g., service plan) capabilities to allow the one or more service usage activities with higher access network performance or full access network performance;

23. a notification that one or more service usage activities are available or are allowed for the present service plan at the present time, or for the present active network, or for a roaming network, or for the present network busy state or congestion state, or for the present QoS availability, and the present service cost, price, rate of cost or rate of price for the one or more service usage activities;
24. a notification that a service usage activity is not allowed on the current active network but is available on an alternative network;
25. a special service offer to provide a discounted, free, limited service allowance or limited time offer to try one or more service usage activities;
26. a notification indicating that a new service plan or new service usage activity is available for the device;
27. a notification indicating that another network with enhanced or potentially enhanced service performance, service usage policy allowances, or service usage pricing is available;
28. an indication of the amount of service used (e.g., bytes, minutes/time, number of usage events (such as a number of videos watched, number of web sites visited, number of URLs, number of songs, or number of transactions), percentage of service plan limit consumed, or cost of service consumed) by the device;
29. an indication of the amount of service used by a user;
30. an indication of the amount of service used by a device group;
31. an indication of the amount of service used by a user group;
32. an indication of the amount of service usage allowance remaining for a device, a service usage activity (e.g., an application, a network destination, or a service type) or a device group;

33. an indication of the service usage velocity (e.g., rate of service usage, rate of service usage compared to a rate of service usage equal to the service usage limit divided by service plan period, service usage per unit of time, % of plan limit per unit of time, projected period of time to reach usage limit, rate of service cost or service charge accumulation, or projected usage or cost at end of plan period) of a device;
34. an indication of the service usage velocity of a user;
35. an indication of the service usage velocity of a device group;
36. an indication of the service usage velocity of a user group;
37. a notification that a service usage activity may cause a service usage overage;
38. a notification that a service usage activity may cause a service usage overage, with a user option to continue the activity or discontinue the activity;
39. a notification that a service usage activity may cause a service usage overage, with a user option to continue the activity or discontinue the activity, and a user acknowledgement if the user elects to continue the activity;
40. a notification informing the user that typical service usage of a service usage activity selected by the user would result in a specified service usage velocity;
41. a notification informing the user that typical service usage of a service usage activity selected by the user would result in a specified service usage velocity, and providing the user with the option to discontinue or continue the service usage activity;
42. a notification informing the user that typical service usage of a service usage activity selected by the user would result in a specified service usage velocity, and providing the user with the option to discontinue or continue the service usage activity, and a user acknowledgement if the user elects to continue the service usage activity;
43. a notification of which service usage activities are contributing to, or contributing most significantly to, service usage;

44. a notification of which service usage activities are contributing to, or contributing most significantly to, service usage, where the service usages are classified by application, network destination or service type;
45. a notification of which service usage activities are contributing to, or contributing most significantly to, a potential service usage overage or a potential service usage overage;
46. an indication of the amount of service used by a service usage activity on the device or by a group of service usage activities on the device;
47. an overage notification of a service usage overage based on the service policy, in which the overage notification includes an indication that the service usage overage is being billed to a service account associated with the communications device or a user of the communications device;
48. an indication of the amount of service used by a group of devices or users;
49. an indication of the amount of service used by a service usage activity or group of service usage activities common to a group of devices or users;
50. an indication of the amount of service usage consumed by a different device than the device the notification is displayed on;
51. an indication of the amount of service usage consumed by a different device than the device the notification is displayed on where the different device is a member of the device group (e.g., family plan group or corporate group) that the notification display device also belongs to;
52. an overage notification of a service usage overage based on the service policy, in which the overage notification includes an indication that the service usage overage is being billed to a multi-user service account associated with the communications device, in which the multi-user service account includes an enterprise account or a family plan account for a plurality of users;
53. an overage notification of a service usage overage based on the service policy, in which the overage notification includes an indication that the service usage overage is being billed to a service account associated with the communications

device or a user of the communications device, and in which the processor of the communications device is further configured to request an acknowledgement of the notification and report the acknowledgement to a network device;

- 54. a notification to one device in a device group (e.g., a family plan or enterprise user plan) that provides usage breakdown for one or more other devices in the device group;
- 55. a notification to one device in a device group that provides options to control or modify access policies, performance or limits for one or more service usage activities for the device group or for a subset of the devices in the device group;
- 56. a notification that a service usage activity, service plan or service capability was added, updated, upgraded, or changed on the device
- 57. a notification that a service usage policy was changed on the device;
- 58. a notification indicating that a sponsored service usage activity (e.g., service usage activity paid for by a party other than the user; sponsored application or website access for shopping or books or other products or services; or sponsored application or website access for search, news, video clips, or other content; or sponsored enterprise network services access) is available on the device;
- 59. an indication of the amount of service used by a sponsored service usage activity;
- 60. a notification that the usage of a sponsored service activity is outside of sponsored service usage policy limits;
- 61. a notification stating that a service usage limit is being approached or has been reached for a sponsored service activity;
- 62. a notification stating that a service usage limit is being approached or has been reached for a sponsored service activity and offering a set of alternatives to continue using services;
- 63. a notification of device user good customer standing;
- 64. a notification that device user good customer standing is sufficient to perform a set of service usage activities;

- 65. a notification that device user good customer standing is insufficient to perform a set of service usage activities;
- 66. a notification informing the user how to accumulate good customer standing;
- 67. a notification indicating the amount of good customer standing points;
- 68. a notification message providing a user offer to purchase a service plan or other transaction based on a programmable notification trigger event detection criteria (e.g., a pattern of one or more applications and/or network destinations being accessed by the user, an access to a particular network, or access to a network with a particular device geographic location);
- 69. a notification message providing a user with the available roaming networks that can be automatically joined;
- 70. a notification message providing a user with the available roaming networks and their associated usage fees;
- 71. a notification message providing a user with the available roaming networks and their associated performance, service plan policies, or service policy allowances;
- 72. a notification message providing a user with the estimated roaming service usage amount;
- 73. a notification message providing a user with the estimated roaming service usage cost;
- 74. a notification message providing a user with the estimated roaming service usage velocity or rate of cost accumulation;
- 75. a notification message providing a user with the estimated roaming service usage amount or cost given current or historical usage behavior;
- 76. a notification message warning a user that a service usage activity that has been selected may or will result in a high rate of roaming service usage or a high rate of service usage cost accumulation;
- 77. a notification message warning a user that a roaming service usage activity has been initiated or attempted that has a typical or average service usage velocity or

service cost accumulation that is higher than a user specified or a service design administrator specified roaming service usage velocity or cost accumulation limit;

78. a notification message warning a user that a roaming service usage activity has been initiated or attempted that has a typical or average service usage velocity or service cost accumulation that is higher than a user specified or a service design administrator specified roaming service usage velocity or cost accumulation limit, and a user option to discontinue or continue the service usage activity;
79. a notification message providing a user with the estimated roaming service usage velocity or rate of cost accumulation for the device, a service usage activity, or a collection of service usage activities;
80. a notification message provided to one device user regarding the roaming usage behavior of another device or another device user;
81. the aggregate roaming service usage for a device group or a user group;
82. a notification informing a device user of the present service level that is selected or available but not selected for streaming audio or video services (e.g., available bit rates for audio or video, or audio or video resolutions);
83. a notification message providing a device user with a list of typical, expected, average or actual service activity usage events or usage units that a service plan or service policy set usage limit will provide (e.g., typical number web page downloads or minutes/hours, number of social networking pages or minutes/hours, number of voice calls or minutes/hours at one or more audio quality levels or resolutions, number of video calls or minutes/hours at one or more video quality levels or resolutions, number of streaming audio clips or songs or minutes/hours at one or more audio quality levels, number of video clips or minutes/hours at one or more video quality levels or resolutions, number of email text messages or downloads, number of file downloads, number of games played or gaming minutes/hours, number of books downloaded, number of songs played or downloaded, number of news report or magazine deliveries or hours/minutes,

number of web site page downloads or minutes/hours, or number of application usages or hours/minutes);

84. a notification message providing a user with a list of questions, and possibly contingent questions resulting from answers, regarding their access service needs to assist the user in determining a service plan (e.g., or service policy set) that fits the user's needs;
85. a notification message providing a user with a list of questions, and possibly contingent questions resulting from answers, regarding issues or problems they are having with their access service to assist the user in determining the root cause or a resolution;
86. a notification message to the user recommending action to resolve an access service problem or issue;
87. a notification message to the user requesting or recommending initiation of a remote diagnostics service, instruction service (e.g., sequence of instruction pages or possibly interactive instruction pages), chat service, voice service or video service to provide assistance the user in selecting a service plan or troubleshooting an access service issue or problem;
88. a notification message to the user requesting or recommending initiation of a remote diagnostics service, instruction service (e.g., sequence of instruction pages or possibly interactive instruction pages), chat service, voice service or video service to provide assistance the user in selecting a service plan or troubleshooting an access service issue or problem, in which the notification message and user options are provided as a sponsored service for the device;
89. a notification message sequence to the user initiating and conducting a remote diagnostics service or chat service to assist the user in selecting a service plan or troubleshoot an access service issue or problem;
90. a notification message sequence to the user initiating and conducting a remote diagnostics service or chat service to assist the user in selecting a service plan or troubleshoot an access service issue or problem, where the notification message

sequence and user communication is provided as a sponsored service for the device;

91. notification message requesting permission from the user to upload to the network service usage history or service activity history or application activity history (e.g., device service usage history or attempted service usage history, or service usage activity history or application activity history);
92. a notification message providing a user with one or more of: network connection status, network connection throughput (e.g., bit rate and/or packet rate measured at the PPP layer, IP layer, or stream layer), network connection throughput variability, network connection bit error rate or packet error rate, network connection success vs. connection attempt (e.g., percentage of successes, or counts of attempts and successes), or another measure of network connection performance;
93. a notification message requesting permission from the user to upload to the network, access network connection performance history information;
94. a notification message sequence in which the user is provided with the result of an analysis of wireless connection performance, quality or status history information, possibly with recommendations on how to resolve an access service issue;
95. a notification message providing a user with one or more of: network connection signal strength, network connection signal to noise ratio, raw modem bit rate, modem bit error rate, modem channel, base station or base station sector, network busy state or network congestion state, or another measure of wireless connection performance, wireless connection quality, or wireless connection status;
96. a notification message requesting permission from the user to upload to the network, wireless connection performance, or quality or status history information;
97. a notification message sequence in which the user is provided with the result of an analysis of wireless connection performance, quality or status history information, possibly with recommendations on how to resolve an access service issue; and

98. any of the above notification embodiments in which a notification of the amount, velocity, or typical projection of service usage is specified in the above embodiment description, and the notification of the amount, velocity, or typical projection of service usage specified in the above embodiment description is replaced by a notification of the amount, velocity, or typical projection of service cost or price.

[0089] In some embodiments, the processor of the communications device is further configured to: detect that multiple wireless networks are available for wireless communication for network service usage (e.g., 2G, 3G, 4G, WiFi, and/or other types of wireless network access); and generate a user notification including multi-network service plan options (e.g., service plan options and/or differentiated notification policy settings for 2G, 3G, 4G, WiFi, and/or other types of wireless network access).

[0090] In some embodiments, the processor of the communications device is further configured to: detect when the communications device is connected to a roaming network; and generate a roaming cost notification including roaming cost information for roaming service usage on the roaming network. In some embodiments, the processor of the communications device is further configured to: detect when the communications device enters and leaves a roaming network; and generate both roaming cost notification based on service usage on a roaming network as well as cost notification associated for when communication device uses services within network so that at all times the device user/owner is aware of the total cost where the cost is a function of the roaming network where the device is currently roaming. In some embodiments, the processor of the communications device is further configured to: generate a cost notification that includes a roaming cost notification including roaming cost information for roaming service usage on the roaming network and an in-network cost notification including in-network cost information for service usage on one or more networks that are in-network for a service plan associated with the communications device. In some embodiments, a communications device can roam across various networks in different international regions (e.g., CDMA, GSM, GPRS, EDGE, HSPA, and LTE roaming capabilities). In some embodiments, a roaming service usage measure is displayed while a communications device is in a roaming mode. In some embodiments, the roaming service usage measure indicates a data usage measure (e.g., the roaming service usage measure can display data usage in kilobytes (KBs), for example,

an international meter/gauge, and the non-roaming/in plan service usage measure can display data usage in megabytes (MBs), for example, a domestic usage meter/gauge). In some embodiments, a pay for service usage measure is displayed along with a cost of service usage while a communications device is in a roaming mode that is in a pay for service roaming service mode (e.g., is not within a covered service plan under a roaming service plan). In some embodiments, a differentiated notification policy is provided, in which, for example, the user notification is adapted or customized to provide user notifications based on a service plan, service component, and/or service activity associated with the device. For example, different UI notification triggers and message sequences can be provided for different services. As another example, different gauges or meters can be provided for different services. In some embodiments, thresholds and alerts are different and/or can be configured differently for in plan, roaming, and/or pay for service network service usage. In some embodiments, a service usage measure is a hyperlinked widget that when selected by a user connects to a service plan options portal or web page or other application that allows a user to view the current service plan and select changes, options, and/or upgrades or new service plans.

[0091] In some embodiments, the processor of the communications device is further configured to: receive a network based service usage measure to periodically synchronize the device based service usage measure based on the network based service usage measure. In some embodiments, the processor of the communications device is further configured to: receive a network based service usage measure to synchronize the device based service usage measure based on the network based service usage measure, in which the network based service usage measures are sent to the communications device based on one or more of the following: a time based event, a service usage based event, and a service plan based event (e.g., plan start date, plan rollover date, service plan feature change, new/upgraded service plan, and/or other service plan based events). In some embodiments, the processor of the communications device is further configured to: receive a network based service usage measure to periodically synchronize the device based service usage measure based on the network based service usage measure, in which the device based service usage measure includes a bulk service usage measure by service plan and/or by service provider; and monitor network based service usage to update the device based service usage measure between network based service usage measure synchronizations. In some embodiments, the user notification generates an alert based on the monitored network based

service usage, and the alert is not displayed until the monitored network based service usage measure is verified based on a network based service usage measure synchronization. In some embodiments, the processor of the communications device is further configured to: receive a network based service usage measure to periodically synchronize the device based service usage measure based on the network based service usage measure, in which the device based service usage measure includes a bulk service usage measure by service plan and/or by service provider.

[0092] In some embodiments, the processor of the communications device is further configured to: receive the service policy for assisting control of the communications device use of a network service, in which the service plan includes an overall service usage limit and/or a per service usage limit, and in which the service policy is periodically updated.

[0093] In some embodiments, the processor of the communications device is further configured to: determine a velocity of service usage based on a projected service usage; and generate a velocity of service usage notification, in which the velocity of service usage notification includes, for example, the amount of service usage compared to the service usage that would be achieved at the present time if the service limit were to be consumed linearly over the service usage plan period. In some embodiments, a velocity of service usage notification can include the projected service usage at the end of the service plan period if current usage patterns continue. In view of the various embodiments described herein, one of ordinary skill in the art will appreciate that various service usage velocity related user notifications can be provided. In some embodiments, a service usage velocity related user notification includes an indication of whether the current rate of service usage is likely to result in a service usage over-run during the plan period or result in service usage that is within the service plan cap. In some embodiments, service usage velocity related user notification includes generating a alert message user notification when the service usage velocity is high. In some embodiments, after the alert message user notification is generated, the user is provided with an option to select another service plan (e.g., or service plan option/feature) that may be better suited to the user's service usage behavior.

[0094] In some embodiments, the processor of the communications device is further configured to: analyze a service usage history for the communications device; determine a service usage ranking; and generate a service usage notification including a service usage

ranking for one or more monitored network service usage activities and a relative share of overall service usage by each of the one or more monitored network service usage activities.

[0095] In some embodiments, the processor of the communications device is further configured to: display one or more options for purchasing one or more of the following: a requested service usage activity, time for additional network service usage, a new service plan, an upgraded service plan, and a sponsored service; and request a user acknowledgement, in which the user acknowledgement authorizes a user's purchase. In some embodiments, the processor of the communications device is further configured to: display one or more options for purchasing network service access, in which the one or more options are based on the service policy, and in which the network service usage is off peak or on peak, and the network service usage is controlled based on whether the network service usage is off peak or on peak. For example, the UI notification can include new and/or upgrade/downgrade service plan options, including, in some examples, recommendations based on monitored service usage behavior/patterns (e.g., a high bandwidth service usage user is recommended to purchase an unlimited data plan or higher data limit plan than a low bandwidth service usage user). In another example, the UI notification can include bulk service offerings and or specific/individual service offerings (e.g., e-mail, music download/streaming, video/TV streaming, and/or other services).

[0096] In some embodiments, the processor of the communications device is further configured to: classify one or more monitored network service usage activities; and generate one or more user notifications based on the one or more classified network service usage activities. In some embodiments, the processor of the communications device is further configured to: classify one or more monitored network service usage activities as foreground activities, background activities, system activities, network capacity controlled service activities, and/or service plan based alert activities; and generate one or more user notifications based on the one or more classified network service usage activities. In some embodiments, the processor of the communications device is further configured to: identify one or more monitored network service usage activities using one or more signatures to identify one or more applications executed on the communications device (e.g., using a table stored on the communications device or a network based table to verify/validate the application name, for example, to verify that the application, such as to verify that iexplore.exe is not masquerading as outlook.exe); and generate one or more

user notifications based on the one or more classified network service usage activities. In some embodiments, the processor of the communications device is further configured to: classify one or more monitored network service usage activities as foreground activities, background activities, system activities, network capacity controlled service activities, and/or service plan based alert activities; and generate one or more user notifications based on the one or more classified network service usage activities, in which a user notification for a foreground activity, network capacity controlled activity, and/or a service plan based alert generates a user notification alert, and a user notification for a background activity and/or a system activity generates a queued user notification, in which the user notification alert includes one or more of the following: a status tray based message, a widget based message, a pop-up window based message (e.g., a toast), an email message, a text message (e.g., SMS message), and a voice message.

[0097] In some embodiments, the user notification includes a service plan alert based on monitored network service usage on the communications device and alerting thresholds associated with the service policy, a service plan associated with the communications device, configured alerting thresholds, and/or user configured preferences for user notifications. In some embodiments, the user notification includes a service plan alert based on monitored network service usage on the communications device and one or more alerting thresholds based on a percentage of overall service usage and/or per service usage allowance under a service plan associated with the communications device. In some embodiments, the user notification includes a service plan alert that a requested network service access is being blocked as it exceeds an allowance under a service plan associated with the communications device, and in which the service plan alert includes an option for the user to proceed with the requested network service access including an acknowledgement of any associated overage charges associated with the requested network service access. In some embodiments, the user notification includes a service plan alert that a requested network service access is being blocked as it exceeds an allowance under a service plan associated with the communications device, and in which the service plan alert includes an option for the user to select one or more offers for free or for purchase that would allow for the requested network access.

[0098] In some embodiments, the user notification includes a user interface gauge. In some embodiments, the user notification includes a user interface gauge, in which the usage

gauge includes a fuel gauge and/or usage meter (e.g., a usage meter with overage indicates a current service usage in excess of a current service plan capacity/data limit, and/or a velocity meter can provide a velocity of current usage and an estimate of cost for estimated service usage for a period of time based on the current and/or estimated usage). In some embodiments, the user notification includes a fuel gauge and/or usage meter providing an indication of an overall network service usage of the communications device during a period of time. In some embodiments, the user notification includes a fuel gauge and/or usage meter (e.g., a usage bar) providing an indication of an overall network service usage of the communications device during a period of time for a limited data plan, and in which the user notification further includes a purchase more data option, a purchase individual services option, and/or purchase a new service plan option. In some embodiments, the user notification includes a fuel gauge and/or usage meter providing an indication of network service usage by one or more monitored network service usage activities of the communications device during a period of time. In some embodiments, the user notification includes user privacy input controls, in which the user privacy input controls include an opt in/out option to allow a user to select an opt in or opt out option for data usage patterns monitoring and reporting for one or more network services. In some embodiments, user privacy information (e.g., user visited web sites, user purchase transactions, service usage information, and/or other user privacy information) is securely stored locally on the device and not shared with any third parties or communicated to any network elements unless a user selects an opt in option and/or otherwise configures/agrees to share certain such privacy information. In some embodiments, the user notification includes a usage meter relative to a velocity gauge.

[0099] In some embodiments, the processor of the communications device is further configured to: calculate a cost of monitored network service usage, in which the user notification includes a meter with overage to provide a cost notification including the cost of monitored network service usage. In some embodiments, the user notification includes a meter with overage to provide a projected cost notification including a projected cost of monitored network service usage. In some embodiments, the user notification includes a cost alert to indicate a cost notification or projected cost notification for monitored network service usage activities of the communications device during a period of time. In some embodiments, the user notification includes a roaming indicator to indicate that the communications device is roaming

and whether the roaming is with an in plan roaming partner or not with an in plan roaming partner. In some embodiments, the user notification includes a time of day indicator to indicate whether it is in peak time or off peak time based on a service plan associated with the communications device. In some embodiments, the user notification includes master fuel gauge, and in which the master fuel gauge provides a master service usage indicator for a plurality of communications devices associated with a multi-device or multi-user service plan associated with the communications device.

[00100] In some embodiments, the user notification includes a single device fuel gauge and a master fuel gauge, in which the master fuel gauge provides a master service usage indicator for a plurality of communications devices associated with a multi-device or multi-user service plan associated with the communications device, and in which the master fuel gauge provides an overall service usage activity and/or a per service usage activity during a period of time. In some embodiments, the multi-user or multi-device service usage accounting for the device notification fuel gauge or service usage indicator is implemented as follows. Device service usage monitoring for more than one device is maintained in the network. A network element identifies the devices that belong to a given multi-user or multi-device account and aggregates the usage account for the usage information available at a given usage update time for all devices belonging to the account. The network element provides/makes available the aggregate usage indication to a single device for display on the device multi-user or multi-device fuel gauge or usage indicator. In some embodiments, the network element makes the aggregate usage indication available to a given device by placing the information in a service usage synchronization update as described herein with respect to various embodiments. In some embodiments, the network element makes the aggregate usage indication available to a given device by responding to a device request for aggregate multi-user or multi-device service usage update.

[00101] In some embodiments, the multi-user or multi-device service usage accounting for the device notification fuel gauge or service usage indicator is implemented as follows. Each device that belongs to a multi-user or multi-device account separately reports the device service usage as measure by the device as described herein with respect to various embodiments. A network element identifies the devices that belong to a given multi-user or multi-device account and aggregates the usage account for the usage information available at a given usage update

time for all devices belonging to the account. The network element makes the aggregate usage indication available to a single device for display on the device multi-user or multi-device fuel gauge or usage indicator. In some embodiments, the network element makes the aggregate usage indication available to a given device by placing the information in a service usage synchronization update as described herein with respect to various embodiments. In some embodiments, the network element makes the aggregate usage indication available to a given device by responding to a device request for aggregate multi-user or multi-device service usage update. In some embodiments, for multi-user or multi-device service usage notification, the device service usage measure is also synchronized or updated on the device using one of the network service usage synchronization embodiments described herein with respect to various embodiments. In some embodiments, for multi-user or multi-device service plan service usage notification the device based measures are synchronized with network based service usage measures in the network prior to aggregation of device usage for all devices that belong to a multi-user or multi-device service plan.

[00102] In some embodiments, the multi-user or multi-device service usage notification system is configured by the service provider or by the user to inform the user of one device when another user or another device reaches a certain service usage state or when a certain service usage pattern is detected. For example, a master user (e.g., plan owner) for a multi-user account or a multi-device account can be informed when another user or another device reaches a pre-defined service usage threshold, a service usage limit or a particular service usage pattern occurs, and this pattern is used to define the notification trigger event detection criteria. In some embodiments, service usage patterns include one or more of the following: one or more applications executing on the device, service usage velocity or rate over a given period of time above a given threshold, service usage cost above a given threshold, certain network destinations being accessed, a certain amount of time spent a given service usage activity or set of service usage activities (e.g., texting or social networking usage, such as Facebook), or any of the above service usage patterns that occur in a given pre-determined time period or during a given network busy state. In some embodiments, service usage patterns are determined by having the network detect the service usage threshold or service usage pattern and then sending the user or device a usage notification message to the master user's device notification system. In some embodiments, service usage patterns are determined by sending individual usage measures for

each user or device to the master user's device, and the master user device notification system determines when the service usage threshold is reached or service usage pattern occurs. In some embodiments, the user sets the criteria for such a usage threshold or usage pattern notification trigger event, and this user input is then used to define a notification trigger event detection criteria. For example, using these techniques a parent can set daily or monthly service usage limits on a child's device and desire to be notified when those limits are exceeded, or can be notified when a child uses certain service activities such as text, email, or Facebook after a given time in the evening. In some embodiments, a user notification function is provided to a master device to allow the user to set thresholds or identify notification service activity usage pattern trigger events that are used to define one or more notification trigger event detection criteria. In some embodiments, the user can also use the user notification function to set service usage limits and/or service activity network access permissions, such as bulk (e.g., open access plan) daily or monthly usage limits for another user or another device, service activity network access restrictions based on time of day, service cost limits for a given period of time, and various other service usage limits and/or service activity network access permissions.

[00103] In some embodiments, the processor of the communications device is further configured to: receive a network based service usage measure to periodically synchronize the device based service usage measure based on the network based service usage measure, in which the user notification includes a master fuel gauge, and in which the received network based service usage measure includes network based service usage measures for each of the communications devices and/or users associated with a multi-device or multi-user service plan associated with the communications device.

[00104] In some embodiments, the user notification includes one or more of the following: a text message, an email message, a voice message, a user portal accessible via a web site, a hyperlinked user interface notification, and/or an application executed on the communications device. In some embodiments, the user notification includes a plurality of graphical user interface notifications that are implemented in a common format across a plurality of system and/or software operating platforms for a plurality of communications device types. In some embodiments, the user notification includes a widget, in which the widget when selected by a user launches an application executed on the communications device for displaying additional information and/or options for user selection. In some embodiments, the user notification

includes one or more of the following: a toast (e.g., a toast UI element that provides a pop-up window/message with information displayed to a user for a specified/configurable/dynamically determined period of time and/or until dismissed by the user; for example, on the Android operating system platform, toast refers to an Android class that handles pop-up messages that appear for durations of time), a widget, a desktop icon (e.g., implemented as a widget), a dynamic desktop icon (e.g., implemented as a widget), a hyperlinked user notification, and a status tray message (e.g., a status tray message element on an Android based operating system).

[00105] In some embodiments, monitoring the network service usage activity based on a service policy for assisting control of the communications device use of a network service is implemented using a mobile operating system, in which the mobile platform operating system includes one or more of the following: an Android operating system, a Microsoft Windows Mobile operating system, an Apple iPhone operating system, a Symbian operating system, and an HP/Palm operating system. In some embodiments, the monitor the network service usage activity based on a service policy for assisting control of the communications device use of a network service is implemented using a mobile platform operating system, and in which application event monitoring is performed in a user space of the mobile platform operating system and a policy enforcement is performed in a kernel space of the mobile platform operating system. In some embodiments, the monitor the network service usage activity based on a service policy for assisting control of the communications device use of a network service is implemented using an Android operating system, and in which the processor is further configured to: listen to an application start intent thread using a policy manager executed in a framework layer of the Android operating system to identify a request to execute a first application, in which the policy manager is a subscriber to the application start intent; determine if the service policy includes a first set of policies that apply to the first application using the policy manager; and communicate the set of policies to a policy enforcement agent, in which the policy enforcement agent executes in a kernel layer of the Android operating system.

[00106] In some embodiments, monitoring the network service usage activity based on a service policy for assisting control of the communications device use of a network service is implemented using an Android operating system, and in which the processor is further configured to: listen to an application start intent thread using a policy manager executed in a framework layer of the Android operating system to identify a request to execute a first

application, in which the policy manager is a subscriber to the application start intent; determine if the service policy includes a first set of policies that apply to the first application using the policy manager; and communicate the set of policies to a policy enforcement agent using an interface request that includes an application identifier and a control request, in which the policy enforcement agent executes in a kernel layer of the Android operating system, in which the control request includes one or more of the following: a user notification setting, a throttle setting, a block setting, an access control setting, a traffic control setting, a billing system setting, a user notification with acknowledgement setting, a user notification with synchronized service usage information, a user privacy setting, a user preference setting, an authentication setting, an admission control setting, an application access setting, a content access setting, a transaction setting, and a network or device management communication setting.

[00107] In some embodiments, the device based service usage measure based on a network based service usage measure, in which the network based service usage measures pulled and/or pushed to the communications device. In some embodiments, the push and/or pull of the network based service usage measure(s) are sent to the communications device based on one or more of the following: a time based event (e.g., periodically), a service usage based event (e.g., approaching, at, or exceeding a service usage threshold such as 50%, 75%, 90%, and/or 100% of a service plan data limit, and/or a type or category of service usage request, such as a roaming service usage request, and/or a pattern of service usage or change in pattern of service usage), and a service plan based event (e.g., approaching, at, or exceeding a service usage threshold based on the service plan or increments such as 5% or 10% increments relative to a service plan limit, and/or a type or category of service usage request, such as a service usage request that is outside of the service plan, and/or a new service plan or upgraded service plan). For example, by providing a periodic and/or event based synchronization, the communications device can have a relatively accurate service usage measure while not using unnecessary network bandwidth for such synchronization communications over the wireless network. In some embodiments, the synchronization communications can be performed over WiFi and/or other non-cellular network communications when available to reduce over the air cellular network usage for such synchronization communications. In some embodiments, a service controller or other network element/function provides the network based service usage measure in communication (e.g.,

secure communication) with the communications device using push and/or pull techniques as discussed herein.

[00108] In some embodiments, the various pull and/or push techniques described herein can provide for network communications to the communication device for implementation of various embodiments of UI notifications for DAS, including, for example, service usage synchronization information, status information, and/or alert or other types of notifications. For example, using the techniques described herein, UI notifications for DAS can provide various service usage, service plan, charging, and/or billing related information without requiring the user to log into a web page to access such information to learn, for example, that they are projected to exceed or have exceeded their service plan usage limit for a particular service or bulk service usage or other events or information that may be of interest to a particular user. In some embodiments, various thin client techniques used in which, for example, the device presents notifications based on network communications as would be apparent to one of ordinary skill in the art in view of the various embodiments described herein. In some embodiments, various smart client techniques used in which, for example, the device presents notifications based on network communications and using locally stored or cached information that can be generated using client based techniques and/or stored based on previously received network communications and/or using client based UI notification and/or display techniques as would be apparent to one of ordinary skill in the art in view of the various embodiments described herein. For example, as described herein, the communications device can maintain a local service usage measure using device based service usage monitoring to supplement the synchronized service usage measure since a last network communication to synchronize the service usage measure.

[00109] In some embodiments, various hybrid techniques are provided that include various combinations of device based and network based techniques for providing UI notifications for DAS as described herein. For example, network based and device based service usage measures can be synchronized based on time stamps or other or similar techniques to facilitate an accurate service usage measure synchronization. For example, the communications device can receive only needed information since a last network communication (e.g., an updated network based service usage measure if that measure has changed since a last synchronization communication, but the service plan is not requested/received if the service plan information has not changed since the last synchronization communication) and/or request only needed

information since a last network communication (e.g., parameters requested are only those needed as the communications device stores other parameters that were previously received and not updated/changed, and the communications device presents UI notifications using a locally generated/implemented UI, such as a native UI). As another example, certain alerts can be implemented/performed locally (e.g., alerts for 25% and 50% of service usage based on a local usage measure relative to a locally stored/cached service plan service usage limit, such as estimated or project usage counts, but synchronization can be required before generating alerts that also include a service plan upgrade option and/or warnings that the user is exceeding and/or projecting to exceed a service plan service usage limit). As another example, a native UI implementation (e.g., smart UI) can present a user with options to buy/accept overage or select a new/upgraded service plan upon receiving network usage synchronization indicating the current service plan is about to and/or is projected to reach its limit (e.g., 95% or higher of a service plan capacity/data limit/cap) or just exceeded its cap (e.g., 100% or higher of a service plan capacity/data limit/cap), and if the user selects a request to either buy/accept overage or select a new/upgraded service plan the communication device can then notify a network element/function of the request to be implemented in, for example, network provisioning elements/functions to continue uninterrupted network service (e.g., this functionality is facilitated by the communication device implementing a native UI or smart UI as described herein with respect to various embodiments) (e.g., and usage meters and user notifications can be updated as appropriate, and the current data session (if any) is not dropped). As another example, an alert can be queued/cached as pending (e.g., not yet presented to the user) until a network synchronization communication to verify service usage measure and/or other device based monitored/measured information that triggered that alert, and the alert can then be presented/displayed to the user if the network synchronization communication verifies the information supporting such an alert. As another example, a Real Time Reporting (RTR) element/function can be configured with rules/alerts based on a network based service usage measure, which are communicated to a Home Agent (HA) that is in the data path for monitoring the service usage of the communications device, which can then monitor the service usage and then generates alerts/reports/updates to the communications device based on the configured rules/alerts. As yet another example, UI can be implemented by the communications device and the traffic control (e.g., blocking, throttling, and/or other traffic control techniques) can be

implemented on the network, on the communications device, and/or various combinations based on the communications device, the network, the type of service usage or traffic (e.g., encrypted service usage may be implemented on the communications device and may not be subject to deep packet inspection for traffic control/monitoring on the network, such as at a DPI due to encryption of such traffic).

[00110] In some embodiments, a service usage measure is reset upon a service plan rollover date/end of period (e.g., a monthly service plan cap/limit associated with certain service usage can be reset at the end of each monthly period under the service plan based on a time stamp indicating when the service plan rolled over). In some embodiments, UI notifications for DAS includes providing a remaining service usage availability notification based on upon the service plan cap/limit and current service usage measure and/or projected service usage measure, for example, prior to the service plan roll over date. In some embodiments, the service plan usage measure includes a service usage data volume measure. In some embodiments, the service usage measure includes a voice minutes measure. In some embodiments, the service usage measure includes a QoS related service usage measure. In some embodiments, UI notifications for DAS include providing a UI notification for an overage charge when service usage exceeds a service plan cap and/or different notifications when excess usage surpasses various thresholds beyond the service plan cap (e.g., charging and/or penalty for service usage can change depending on the amount of service usage over the service plan cap and/or based on various other criteria). In some embodiments, UI notifications for DAS include providing a UI notification that includes charging information and/or billing due date and/or other charging and/or billing related information. In some embodiments, UI notifications for DAS include providing a UI notification that includes charging information and/or billing due date and/or other charging and/or billing related information also requests and stores/forwards a user acknowledgement for such charging and/or billing related information (e.g., service plan upgrade/downgrade, overage acknowledgement, and/or other or similar acknowledgement).

[00111] In some embodiments, a service usage measure and a service plan are associated with a subscriber identity module (SIM), and the SIM can be swapped into another communications device (e.g., into another smart phone or other cellular phone and/or a USB dongle for cellular access via, for example, a laptop or net book) for network service usage under the service plan. In some embodiments, the network based service usage continues to be tracked

and associated with the network service usage measure and service plan. In some embodiments, a usage measure (e.g., a usage measure can be based on device assisted service usage monitoring), a device assisted usage measure that is maintained (e.g., stored or cached) on a SIM card and the usage measure is used for updating, synchronizing, and/or initializing device service usage gauge or other UI notifications. In some embodiments, a device based service usage measure, a network based service usage measure, or a combination of both (e.g., a synchronized device/network based usage measure) updates a service usage measure stored on a SIM card. In some embodiments, the SIM card can be replaced with a variety of storage media (e.g., secured media or not secured) that can be moved from device to device. For example, when a user is using a first device, device service usage UI (e.g., a service usage gauge or meter) can be synchronized with an overall service usage measure storage source (e.g., a network element, a SIM, and/or another source). When the user then uses another device, the device service usage UI can first be initialized with the overall service usage storage measure, and the latest usage information can be stored on SIM card so that user can look it up. In some embodiments, SIM card storage is accessed from the network to update usage. In some embodiments, a service usage measure is obtained from the network (e.g., a network element/function, such as a service controller), and the service usage measure is then updated/stored on the SIM card in the device. In some embodiments, a service usage measure is obtained from a SIM card and communicated to the network (e.g., a network element/function, such as a service controller). In some embodiments, a device based service usage measure is stored on the SIM card in the device (e.g., the SIM card storage is accessed to load the current/latest usage and updated with the device based usage measure). In some embodiments, a UI program (e.g., that can be downloaded to the device in one or multiple versions for multiple types of OS and/or devices) downloads usage information and stores the usage information on the SIM card. In some embodiments, SIM service usage information storage is stored in a standardized format (e.g., across SIM cards/media, devices, device OS platforms, and/or carriers). In some embodiments, multiple types of usage information are stored on the SIM card (e.g., including multiple plans and/or multiple plans including with and without separated tethered plans, multiple networks and/or multiple networks including roaming networks, multiple devices, and/or multiple users, such as a family plan, an enterprise plan, or a group plan). In some embodiments, device group information is stored on the SIM card. In some embodiments, the service processor is stored on

the SIM (e.g., SIM card) so that it can load into and run on multiple devices it is installed into. In some embodiments, the service processor is executed on the SIM so that it can run on multiple devices the SIM is installed into. In some embodiments, a portion of the service processor is executed on the SIM, and a portion of the service processor is stored on the SIM that is then loaded onto the device so that the service processor can run on multiple devices the SIM is installed into. In some embodiments, a service usage measure and a service plan are associated with a mobile directory number (MDN). In some embodiments, a service usage measure and a service plan are associated with a mobile directory number (MDN), and a user can change MDNs to get a new MDN, and the service usage measure and service plan can be associated with the new MDN.

[00112] In some embodiments, a monitored network service usage activity includes a tethered network service usage activity (e.g., network service usage activity via a tethered connection, such as tethering a laptop to a mobile/smart phone for cellular access over a 3G/4G or other cellular network in which the laptop is communicating to the mobile/smart phone through some wireless or wired communication link to access the mobile/smart phone's modem for cellular access), and the tethered network service usage activity counts towards a tethered network service usage count and associated with a tethered network service plan. In some embodiments, a user notification is based on the tethered network service usage count and the tethered network service plan. In some embodiments, tethered network service usage activity counts towards a user's service plan data allowance (e.g., tethered usage and non-tethered usage from the communications device will accrue service usage counts from the same data allowance of the service plan associated with the communications device and/or, for example, associated with the SIM inserted in the communications device).

[00113] In some embodiments, UI notifications for DAS includes monitoring a network service usage activity based on a service policy for assisting control of a communications device use of a network service, in which the service policy includes one or more user notification settings based on use of the network service; determining whether the monitored network service usage activity requires a user notification based on the service policy and based on a device based service usage measure using a processor of the communications device; and generating the user notification, in which the device based service usage for the communications device is periodically synchronized with a network based service usage.

[00114] In some embodiments, UI notifications for DAS includes monitoring a network service usage activity based on a service policy for assisting control of a communications device use of a network service, in which the service policy includes one or more user notification settings based on use of the network service; determining whether the monitored network service usage activity requires a user notification based on the service policy and based on a device based service usage measure; and generating the user notification, in which the device based service usage for the communications device is periodically synchronized with a network based service usage.

[00115] In some embodiments, UI notifications for DAS includes determining whether a network service usage activity requires a user notification based on a service policy and based on a service usage measure; and generating the user notification, in which the device based service usage for the communications device is periodically synchronized with a network based service usage.

[00116] In some embodiments, provisioning (e.g., or programming) the notification trigger event detection criteria and subsequent notification message sequences to implement an access service “self help” services by detecting an issue or problem with a user’s service plan selection processes or the network connection performance for the device. For example, various notification triggers can be pre-programmed to initiate a user notification to analyze, diagnose or change the service plan, change the network connection, or fix an issue with the network connection. As another example, a notification trigger can be programmed to identify when a pattern exists in service usage activity history for the device that indicates the user’s service plan selection is not well suited for the user’s desired service usage activities. As yet another example, a notification trigger can be programmed to identify when a pattern exists in service usage activity history for the device that indicates a problem with the device network connection. As yet another example, a notification trigger can be programmed to identify when a pattern exists in service usage activity history for the device that indicates another available network is better suited to the user’s desired service usage activities. These trigger event detection criteria can then lead to trigger index or trigger messages being sent to the notification agent that in turn provides the user with a notification message sequence to assist in “self help” for service plan optimization or network connection performance optimization. In some embodiments, this self

help function is offered as an option to the user in the basic notification message sequences associated with service plan selection.

[00117] For example, service usage activity history can include service usage; service usage classified by service usage activity, time of day, type of network, network busy state, QoS level; service usage attempts vs. successes (e.g., or failures); or performance of the overall device connection or performance of the connection for a specific service usage activity or group of service usage activities. Performance of the connection can be characterized by a variety of measures including bit rate and/or packet rate measured at the PPP layer, IP layer, or stream layer, network connection throughput variability, network connection bit error rate or packet error rate, network connection success vs. connection attempt (e.g., percentage of successes, or counts of attempts and successes), or another measure of network connection performance, network connection signal strength, network connection signal to noise ratio, raw modem bit rate, modem bit error rate, modem channel, base station or base station sector, network busy state or network congestion state, or another measure of wireless connection performance, wireless connection quality or wireless connection status. In some embodiments, some aspects of service usage activity history information can be monitored and reported by network elements. In some embodiments, some aspects of the service usage activity history is or, in some cases, is preferably monitored and reported from the device. In some embodiments, service usage activity history is reported to a network data base on a regular basis. In some embodiments, service usage activity history is reported when it is needed.

[00118] As another example, a notification trigger event detection criteria can be set to detect patterns in service usage activity access attempts vs. successes to determine if the user service plan is adequate or optimized for the usage patterns of the user. For example, a notification trigger event detection criteria can be set to indicate when a user is attempting service usage activities that are being blocked, limited or are not receiving good network connection performance. In some embodiments, the service usage history indicates that the service plan is insufficient for one or more usage activities the user is attempting or using, user is experiencing poor network performance, user is experiencing poor network performance compared to the type of service activities the user is attempting to use or is using, or user cannot get access service.

[00119] In some embodiments, the user is provided with a notification message offering initiation of an “assisted self help service” via connection to a Customer Self Help Server and UI 134, such as for a remote diagnostics service, instruction service (e.g., sequence of instruction pages, or possibly interactive instruction pages), chat service, voice service or video service to provide assistance the user in selecting a service plan or troubleshooting a service plan selection or network connection performance issue or problem. In some embodiments, during the assisted self help service interaction between the device notification agent and the Customer Self Help Server and UI 134, the device service usage activity history is used by a customer care representative who utilizes the UI in the Customer Self Help Server and UI 134 to aid in diagnosis of the device service plan status, service usage activity patterns or network connection status. This service usage activity history information may already be available to the Customer Self Help Server and UI 134 via a network data base for service usage activity history (e.g., Usage Report Store 136) in which the service usage activity history is reported to a network data base on a regular basis. In this example, the device credential associated with the assisted self help session to the customer care representative can be referenced by the Customer Self Help Server and UI 134 as a look up to load the device service usage activity history information into the UI of the Customer Self Help Server and UI 134 for analysis and diagnosis.

[00120] In some embodiments, the service usage activity history information is uploaded to the Customer Self Help Server and UI 134 from the device after the assisted self help session is started and the information may then be displayed on a customer care representative screen for analysis and diagnosis. In some embodiments, the upload of the service usage activity history information from the device into the Customer Self Help Server and UI 134 is automatic. In some embodiments, the upload of the service usage activity history information from the device into the Customer Self Help Server and UI 134 can occur after the user responds to a notification message requesting authorization to upload the service usage activity history information. In some embodiments, the service usage activity history information is periodically uploaded into a network storage data base connected to the upload of the service usage activity history information from the device into the Customer Self Help Server and UI 134, the service usage activity history information is then processed by the upload of the service usage activity history information from the device into the Customer Self Help Server and UI 134 to analyze the history to identify self help notification trigger events, and then the upload of the service usage

activity history information from the device into the Customer Self Help Server and UI 134 either initiates the notification sequence by sending a trigger index or trigger index message, or the upload of the service usage activity history information from the device into the Customer Self Help Server and UI 134 informs a network administrator who then takes action to notify the user.

[00121] In some embodiments, this type of self help or assisted self help notification service is a sponsored service in which the user does not pay for the access fees. In some embodiments, this type of sponsored self help or assisted self help service may be offered on devices that “ship hot” without paid user service plans until a user selects a service plan. In some embodiments, this type of self help or assisted self help service plan or network connection optimization can provide for low cost customer care/support of sponsored service connections, “ships hot” devices that start with free or low cost services and provide service plan upgrade options in the device, and other device service conditions in which it is desired to reduce conventional service calls or carrier service outlet visits.

[00122] In some embodiments, UI notifications for DAS includes receiving a network based service usage measure and a user notification request; and generating a user notification based on the user notification request.

[00123] In some embodiments, UI notifications for DAS includes requesting a network based service status, in which the network based service status includes a network based service usage measure, a service plan information, and/or a user notification request; and generate a user notification based on the network based service status.

[00124] In some embodiments, UI notifications for DAS includes receiving a network based service status, in which the network based service status includes a network based service usage measure, a service plan update, and/or a user notification request; and generating a user notification based on the network based service status.

[00125] In some embodiments, UI notifications for DAS includes receiving a network based service status, in which the network based service status includes a network based service usage measure, a service plan information, and/or a user notification request; and generating a user notification based on the network based service status; in which the first communications device includes a removable subscriber identity module (SIM), the network based service status

is associated with the SIM, the SIM can be swapped into a second communications device for network service usage under a service plan associated with the SIM, and the network based service usage continues to be counted and associated with the network based service usage measure and the service plan.

[00126] In some embodiments, device assisted notification with network based service monitoring is provided. In some embodiments, network based notification event trigger detection is provided. In some embodiments, device based notification management is provided. In some embodiments, a flexible notification system is provided with (i) a wide range of notification trigger event detection criteria, including, for example, DPI service activity usage notification capabilities, (ii) a wide range of arbitrarily complex notification message sequences that can be displayed to a device UI in a manner that is efficient with network bandwidth and resources, and (iii) easy to provision (e.g., program) various network elements and/or device agents required to make the notification system work properly. For example, using such a flexible notification system, a device UI (e.g., GUI) can be used to display various notification messages and/or message sequences, as compared to a simple SMS/text message notification. As another example, using such a flexible notification system, a device UI (e.g., GUI) can be used to display various notification messages and/or message sequences related to current and/or real time service usage monitoring, as compared to simple notifications regarding a usage cap and/or a usage amount available on a web site/service portal.

[00127] In some embodiments, a service monitoring element determines service usage; a programmable notification trigger element inspects service usage records to identify a trigger event detection criteria and generate a trigger index or trigger message. In some embodiments, and the trigger index or trigger message is sent to a communications device; and a device notification element (e.g., agent or other functional implementation) performs one or more of the following: (i) generate a message by using the trigger index to look up pre-stored message sequence information that is sent to the UI (e.g., after additional formatting, such as adding a UI background bitmap), (ii) generate a notification sequence by using a trigger message to look up pre-stored message sequence information (e.g., UI bitmap or UI formatting) and combining the pre-stored information with information included in the trigger message to form the complete notification message sequence that is sent to UI, (iii) generate a notification message by using the trigger index or trigger message information as a reference to notification message sequence

information stored on a network element (e.g., initiate a selected portal or website message, or request a particular set of message sequence information from a server), and send the network stored information to a UI, and (iv) a combination of two or more of the above.

[00128] In some embodiments, a service notification design user interface and associated service notification system provisioning element is included in the notification system, in which the UI accepts carrier network administrator inputs to define, design, specify or provide a reference to the following notification information: (i) the desired notification trigger event detection criteria, (ii) the notification trigger index or trigger message associated with the notification trigger event detection criteria, (iii) the notification message sequence that is to be associated with the notification trigger event detection criteria; and this notification information defined, designed, specified or referenced by the administrator UI is passed to the service notification provisioning apparatus, which then, (iv) programs the programmable notification trigger element with the notification trigger event detection criteria and trigger index or trigger message, (iv) if required programs the routing of the trigger index or trigger message to the device notification element, (v) programs the device notification agent to initiate the desired notification message sequence when the trigger index or trigger message is received.

[00129] In some embodiments, the notification system parameters are distributed between the network element and the device element in which the network element includes the Notification Policy Management & UI 134 functionality in which case the carrier is able to define various notification trigger event detection criteria that include, for example, the following:

1. A notification trigger event detection criteria in which a service usage activity is initiated by a user or device and the service usage activity is on a pre-determined programmable list defined by the Notification Policy Management & UI 134 as a notification trigger event intended to initiate a notification message sequence using one of the notification sequence embodiments disclosed herein;
2. a notification trigger event detection criteria in which a desired service usage activity or the service activity usage patterns for the device are not supported by the network access policies for the current service plan (e.g., or current service policy set) and network;

3. a notification trigger event detection criteria in which a desired service usage activity or the service activity usage patterns for the device are better suited for a service plan or service policy set other than the current service plan or service policy set;
4. a notification trigger event detection criteria in which a desired service usage activity or the service activity usage patterns for the device are better suited for the service plan policies for an alternative available network other than the current network the device is connected to;
5. a notification trigger event detection criteria in which a device or device service usage activity is provided with access service that is limited by the service plan or service policy set, and an alternative service plan or service policy set is available that would result in less access service limitation or no access service limitation;
6. a notification trigger event detection criteria in which a device or device service usage activity is provided with access service that is limited by the service plan or service policy set for the current network, and an alternative network is available that provides a service plan or service policy set that would result in less access service limitation or no access service limitation;
7. a notification trigger event detection criteria in which a device or device service usage activity is provided with access service that is priced at a first cost according to the service plan or service policy set, and an alternative service plan or service policy set is available that would result in a second cost that results in a preferred price result;
8. a notification trigger event detection criteria in which a device or device service usage activity is provided with access service that is priced at a first cost according to the service plan or service policy set for the current network, and an alternative network is available that would result in a second cost that results in a preferred price result;

9. a notification trigger event detection criteria in which the service usage velocity may result in or is likely to result in a service overage given the current service plan or service policy set;
10. a notification trigger event detection criteria in which the service usage velocity is low so that a service plan or service policy set with a lower service usage limit may be better suited to the device or user service usage behavior;
11. a notification trigger event detection criteria in which a service offer is presented to the user when one or more pre-defined service usage activities are initiated;
12. a notification trigger event detection criteria in which a service offer is presented to the user when one or more pre-defined applications are selected or used by the user;
13. a notification trigger event detection criteria in which a service offer is presented to the user when one or more pre-defined patterns of service usage activities or patterns of application selection or application usage activities are present on the device;
14. a notification trigger event detection criteria where a pre-defined level of service usage is reached for the device;
15. a notification trigger event detection criteria where a pre-determined level of service usage is reached for a service usage activity or a group of service usage activities;
16. a notification trigger event detection criteria in which a pre-determined level of service overage is reached, where the service overage is measured in usage amount, percentage of service limit or cost;
17. a notification trigger event detection criteria in which an application that is on a list of high usage apps (e.g., streaming audio, streaming video, or file download or sharing) for the current service plan is selected or used by the user or device;
18. a notification trigger event detection criteria in which the device contains device assisted services agents and a possible fraud event has been detected;

19. a notification trigger event detection criteria where a pre-defined level of service usage velocity is reached for the device;
20. a notification trigger event detection criteria where a pre-determined level of service usage velocity is reached for a service usage activity or a group of service usage activities;
21. a notification trigger event detection criteria in which the user has not yet signed up for service on an available network and is attempting to use a service usage activity that can be supported with the available network;
22. a notification trigger event detection criteria in which the user has not yet signed up for service on an available network and is attempting to use a service usage activity that can be supported with the available network, and no other network is available to the device or user;
23. a notification trigger event detection criteria in which the user or device attempts to use a service usage activity that requires or exhibits improved performance with a QoS level that is beyond the QoS allowance of the current service plan or service policy set;
24. a notification trigger event detection criteria in which the user or device attempts to use a service usage activity that requires or exhibits improved performance with a QoS level that is beyond the QoS available on the current network;
25. a notification trigger event detection criteria in which the user or device attempts to use a service usage activity that requires or exhibits improved performance with a QoS level that is available on an alternative network other than the network the device is connected to;
26. a notification trigger event detection criteria in which a device on the far end of a QoS connection does not have the same QoS availability as the device on the near end;
27. a notification trigger event detection criteria in which the network busy state reaches a pre-determined level or changes to a new level;

28. a notification trigger event detection criteria in which the time of day window reaches a pre-determined state or changes;
29. a notification trigger event detection criteria in which the network busy state or time of day window results in a modification to access service for a service usage activity selected by the user or device;
30. a notification trigger event detection criteria in which a service usage activity that has been selected or is running is provided with background access policies or is provided with access service that is limited in some way;
31. a notification trigger event detection criteria in which a service usage activity access policy is dependent on network busy state or time of day window and the network busy state or time of day window changes;
32. a notification trigger event detection criteria in which device service usage activities are classified into (i) user selected or foreground activities and (ii) OS system, application, or background activities;
33. a notification trigger event detection criteria in which one or more active service usage activities have access policies that are dependent on a combination of one or more of (i) network busy state, (ii) time of day, (iii) active network, (iv) available networks, (v) QoS availability, (collectively the “network state indexes”), and one or more of the network state indexes change;
34. a notification trigger event detection criteria in which a new service plan offering or trial service plan offering has been made available to the device;
35. a notification trigger event detection criteria in which a service usage activity capability, service plan policy or service policy set was added, updated, upgraded, or changed on the device;
36. a notification trigger event detection criteria in which the total service usage amount or service usage velocity for a device group has reached a pre-determined level;

37. a notification trigger event detection criteria in which a first device receives service usage or service cost information pertaining to a second device, a second user, a device group, or a user group;
38. a notification condition wherein the service usage amount or service usage velocity for a first device within a device group reaches a pre-determined level and this is intended to trigger a notification to a second device;
39. a notification trigger event detection criteria in which a pre-determined service usage activity is initiated for a first device and this is intended to initiate a notification for a second device;
40. a notification trigger event detection criteria in which the total service usage amount or service usage velocity for a user group has reached a pre-determined level;
41. a notification condition in which the service usage amount or service usage velocity for a first user within a user group reaches a pre-determined level and this is intended to trigger a notification to a second user;
42. a notification trigger event detection criteria in which a pre-determined service usage activity is initiated for a first user and this is intended to initiate a notification for a second user;
43. a notification trigger event detection criteria in which the service usage or service usage velocity for a sponsored service usage activity exceeds the policy limits for the sponsored service usage activity;
44. a notification trigger event detection criteria in which a service usage activity or a subset of service usage activities running on the device are contributing disproportionately to device service usage amount;
45. a notification trigger event detection criteria in which a service usage activity is available that will provide the user with an opportunity to increase good customer standing or good customer points;
46. a notification trigger event detection criteria in which a service usage activity is available that can be paid for with customer standing or good customer points;

- 47. a notification trigger event detection criteria in which a service usage activity that can be paid for with good customer standing or points is not available due to insufficient good customer standing or points to pay for the activity;
- 48. a notification trigger event detection criteria in which a pre-determined level of good customer standing or points is reached;
- 49. a notification trigger event detection criteria in which one or more roaming networks becomes available;
- 50. a notification trigger event detection criteria in which one or more roaming networks becomes available and a device based table specifying roaming network costs or a network based table specifying roaming network costs is available to the device notification agent;
- 51. a notification trigger event detection criteria in which one or more roaming networks becomes available and a device based table specifying roaming network performance (e.g., speed, voice quality, video quality, or QoS capability) or a network based table specifying roaming network performance is available to the device notification agent;
- 52. a notification trigger event detection criteria in which a pre-determined amount of roaming service usage or roaming service cost is reached;
- 53. a notification condition in which a pre-determined roaming service velocity or rate of cost accumulation is reached;
- 54. a notification trigger event detection criteria in which a service usage activity identified as a high roaming service usage activity is initiated by the user or device;
- 55. a notification trigger event detection criteria in which a service usage activity is initiated that has a defined typical or average service usage velocity that is above a roaming service usage velocity limit set by the user or a service design administrator;

- 56. a notification trigger event detection criteria in which a service usage activity specified as a low priority or background roaming service usage activity is initiated by the user or device;
- 57. a notification trigger event detection criteria in which there is an issue or problem identified in the status or performance of the device connection to the network; and
- 58. a notification trigger event detection criteria in which a first device receives information about the roaming service usage of a second device, a second user, a device group, or a user group.

[00130] In some embodiments, the Notification Policy Management & UI 134 includes separate device group partitions for multiple device groups so that different service usage notification policies and/or message sequences can be supported for different devices, user groups, and/or distribution channels. In some embodiments, the device group partition is defined by the collection of device credentials or user credentials that belong to the device group, and all devices in that device group received the same notification policies and messages sequences. In some embodiments, each device group is managed by a separate secure Notification Policy Management & UI 134 device policy management partition and UI login so that the device groups can be managed by different Notification Policy Management & UI 134 administrators, who may or may not work for the same corporate entity and may or may not be part of the carrier corporate entity.

[00131] In some embodiments, the notification message sequence information can be entered into the UI of the Notification Policy Management & UI 134 or referenced by the Notification Policy Management & UI 134 (e.g., notification message sequence information located on Network Based Notification Message Information 1697B, a reference to a file, a server location, a portal, or a website). This notification message sequence information that can be programmed or referenced with the Notification Policy Management & UI 134 includes information, such as the notification text displayed in various UI interfaces (e.g., dashboard, widget, status or tray); selection buttons such as radio buttons and/or checkbox buttons; notification “shell” or “look and feel” information (e.g., notification message background “branding” information in the form of images, bitmaps, or network server or site references); or

notification user decision trees and the associated notification message sequencing in the form of links to network based UI display files, portal pages (e.g., web view pages) or web pages.

[00132] In some embodiments, most or all of the notification message sequence information is contained on device storage and displayed via a native device UI (e.g., pop-up UI message window, toast message window, or tray message window) or pulled into a browser window as the device notification agent processes and executes the notification message sequence. Such embodiments reduce the air bandwidth, improve the user experience as the user notification is more immediate due to minimal delay between notification trigger and notification message sequence display, and the notification message system is robust as it is not as subject to poor connection or wireless communication conditions and/or can be used in some off-line conditions. In some embodiments, the Notification Policy Management & UI 134 includes provisions to specify what type of notification message is to be sent for a given portion of a notification message sequence (e.g., pop-up, toast, tray, web view, or browser view).

[00133] In some embodiments, some or most of the notification message sequence information is stored on network elements (e.g., notification message sequence information located on Network Based Notification Message Information 1697B, server files, portal pages, or website pages) and displayed via a native device UI (e.g., pop-up UI message window, toast message window, or tray message window) or pulled into a browser window as the device notification agent processes and executes the notification message sequence. Such embodiments can be advantageous when notification message sequence information is more complex and would require large amounts of device memory or the information needs to be updated or modified in real time based on exhibited device service usage behavior, location, and/or application usage characteristics. In some embodiments, the Notification Policy Management & UI 134 can include provisioning to specify what type of notification message is to be sent for a given portion of a notification message sequence (e.g., pop-up, toast, tray, web view, or browser view) and specify the network resources and destination addresses for various portions of the notification message sequence information that are contained on network resources. In some embodiments, the Notification Policy Management & UI 134 can include provisioning the network based notification message sequence information stored on Network Based Notification Message Information 1697B (e.g., or other server files, portal pages, or website pages).

[00134] In some embodiments, an optimized combination of device based notification message sequence information storage and/or display and network based notification message sequence information storage and/or display is utilized in which: (A) some notification message sequences are created with largely device based notification message sequence information storage and/or display when the notification message sequence (i) occurs frequently, (ii) requires rapid UI display timing, and/or (iii) has relatively low complexity or relatively confined sequence decision tree branches; and (B) some notification message sequences are created with largely network based notification message sequence information storage and/or display when the notification message sequence (i) is relatively complex or has relatively many sequence decision branches, (ii) occurs less frequently, and/or (iii) needs to be adapted in real time based on user service usage behavior, application usage behavior, or other user based feedback.

[00135] As described herein, the Notification Policy Management & UI 134 can also be used to program or provision the notification trigger events that are to initiate the notification message sequences, and associate the trigger events with trigger indexes or trigger message which in turn are associated with the notification sequences. In some embodiments, the trigger events and trigger indexes are programmed into network elements (e.g., home agents or RTR reporting elements). In some embodiments, the trigger events and trigger indexes are programmed into device elements (e.g., device agents as described herein).

[00136] In some embodiments, user notifications for DAS includes providing a user notification that includes an indication that a requested application is not supported under a current service plan and an offer to present alternative service plans that support the requested application. In some embodiments, an application startup interceptor blocks the requested application based on a service plan, monitored service usage levels, and/or other criteria, such as network busy state, available quality of service (QoS) level and various other criteria and measures as described herein. In some embodiments, the user notification provides an indication that a requested application is not supported under a current service plan and an offer to present allow the requested application for a higher service usage fee, in which an application startup interceptor blocks the requested application based on a current network busy state. In some embodiments, the user notification provides an indication that a requested application is not supported under a current service plan and an offer to present allowing the requested application for a higher service usage fee, in which an application startup interceptor blocks the

requested application based on a current quality of service level. In some embodiments, the user notification provides an indication that a requested application is being throttled under a current service plan and an offer to present allowing the requested application for a higher service usage fee.

[00137] In some embodiments, user notifications for DAS includes monitoring usage of one or more applications on a plurality of communications devices; determining which of the one or more applications are likely to cause service usage overages or have contributed (e.g., significantly) to service usage overages for one or more service plans; and sending a user notification message to one of the plurality of communications devices, in which the user notification includes an indication that usage of the one or more applications is likely to cause a service plan overage or have contributed (e.g., significantly) to a service usage overage. In some embodiments, user notifications for DAS further includes sending to one of the plurality of communications devices a list of the one or more applications determined to likely cause service usage overages or have contributed (e.g., significantly) to service usage overages for a service plan associated with the one of the plurality of communications devices. In some embodiments, user notifications for DAS further includes sending to one of the plurality of communications devices a list of the one or more applications determined to likely cause a service usage overage or have contributed (e.g., significantly) to service usage overages for a service plan associated with the one of the plurality of communications devices, in which the list of the one or more applications is included in a user notification (e.g., including a UI message or a UI message acknowledgement request).

[00138] In some embodiments, user notifications for DAS further includes receiving at a service usage analytics network element a plurality of service usage reports from a plurality of communications devices; analyzing the service usage report to determine which applications are likely to cause service usage overages or have contributed (e.g., significantly) to service usage overages, and using this information to (i) notify a network administrator of the applications that are likely to cause service usage overages or have contributed (e.g., significantly) to service usage overages; or (ii) automatically program a user notification message in which the user notification includes an indication that usage of the one or more applications is likely to cause a service plan overage or have contributed (e.g., significantly) to a service usage overage. In some embodiments, user notifications for DAS further includes receiving at a service usage analytics

network element a plurality of device service usage reports from a network service usage monitoring element; analyzing the service usage report to determine which applications are likely to cause service usage overages or have contributed (e.g., significantly) to service usage overages, and using this information to (i) notify a network administrator of the applications that are likely to cause service usage overages or have contributed (e.g., significantly) to service usage overages; or (ii) automatically program a user notification message in which the user notification includes an indication that usage of the one or more applications is likely to cause a service plan overage or have contributed (e.g., significantly) to a service usage overage.

[00139] In some embodiments, user notifications for DAS further includes receiving a service usage report from one of the plurality of communications devices; analyzing the service usage report to determine whether to generate a user notification based on the service usage report; and sending a user notification request message to the one of the plurality of communications devices based on the determination, in which the one of the plurality of communications devices uses the user notification request message to identify a pre-stored user notification. In some embodiments, user notifications for DAS further includes monitoring a network based service usage for one of the plurality of communications devices; and sending a user notification request message to the one of the plurality of communications devices based on the monitored network based service usage for the one of the plurality of communications devices, in which the one of the plurality of communications devices uses the user notification request message to identify a pre-stored user notification.

[00140] In some embodiments, user notifications for DAS includes monitoring usage of one or more network destinations on a plurality of communications devices; determining which of the one or more network destinations are likely to cause service usage overages or have contributed (e.g., significantly) to service usage overages for one or more service plans; and sending a user notification message to one of the plurality of communications devices, in which the user notification includes an indication that usage of the one or more network destinations is likely to cause a service plan overage or have contributed to a service usage overage. In some embodiments, user notifications for DAS further includes sending to one of the plurality of communications devices a list of the one or more network destinations determined to likely cause service usage overages or have contributed to service usage overages for a service plan associated with the one of the plurality of communications devices. In some embodiments, user

notifications for DAS further includes sending to one of the plurality of communications devices a list of the one or more network destinations determined to likely cause a service usage overage or have contributed to service usage overages for a service plan associated with the one of the plurality of communications devices, in which the list of the one or more network destinations is included in a user notification (e.g., including a UI message or a UI message acknowledgement request).

[00141] In some embodiments, user notifications for DAS further includes receiving at a service usage analytics network element a plurality of service usage reports from a plurality of communications devices; analyzing the service usage report to determine which network destinations are likely to cause service usage overages or have contributed to service usage overages, and using this information to (i) notify a network administrator of the network destinations that are likely to cause service usage overages or have contributed to service usage overages; or (ii) automatically program a user notification message in which the user notification includes an indication that usage of the one or more network destinations is likely to cause a service plan overage or have contributed to a service usage overage. In some embodiments, user notifications for DAS further includes receiving at a service usage analytics network element a plurality of device service usage reports from a network service usage monitoring element; analyzing the service usage report to determine which network destinations are likely to cause service usage overages or have contributed to service usage overages, and using this information to (i) notify a network administrator of the network destinations that are likely to cause service usage overages or have contributed to service usage overages; or (ii) automatically program a user notification message in which the user notification includes an indication that usage of the one or more network destinations is likely to cause a service plan overage or have contributed to a service usage overage.

[00142] In some embodiments, user notifications for DAS includes monitoring usage of one or more content types, service types or traffic types on a plurality of communications devices; determining which of the one or more content types, service types or traffic types are likely to cause service usage overages or have contributed to service usage overages for one or more service plans; and sending a user notification message to one of the plurality of communications devices, in which the user notification includes an indication that usage of the one or more content types, service types or traffic types is likely to cause a service plan overage

or have contributed to a service usage overage. In some embodiments, user notifications for DAS further includes sending to one of the plurality of communications devices a list of the one or more content types, service types or traffic types determined to likely cause service usage overages or have contributed to service usage overages for a service plan associated with the one of the plurality of communications devices. In some embodiments, user notifications for DAS further includes sending to one of the plurality of communications devices a list of the one or more content types, service types or traffic types determined to likely cause a service usage overage or have contributed to service usage overages for a service plan associated with the one of the plurality of communications devices, in which the list of the one or more content types, service types or traffic types is included in a user notification (e.g., including a UI message or a UI message acknowledgement request).

[00143] In some embodiments, user notifications for DAS further includes receiving at a service usage analytics network element a plurality of service usage reports from a plurality of communications devices; analyzing the service usage report to determine which content types, service types or traffic types are likely to cause service usage overages or have contributed to service usage overages, and using this information to (i) notify a network administrator of the content types, service types or traffic types that are likely to cause service usage overages or have contributed to service usage overages; or (ii) automatically program a user notification message in which the user notification includes an indication that usage of the one or more content types, service types or traffic types is likely to cause a service plan overage or have contributed to a service usage overage. In some embodiments, user notifications for DAS further includes receiving at a service usage analytics network element a plurality of device service usage reports from a network service usage monitoring element; analyzing the service usage report to determine which content types, service types or traffic types are likely to cause service usage overages or have contributed to service usage overages, and using this information to (i) notify a network administrator of the content types, service types or traffic types that are likely to cause service usage overages or have contributed to service usage overages; or (ii) automatically program a user notification message in which the user notification includes an indication that usage of the one or more content types, service types or traffic types is likely to cause a service plan overage or have contributed to a service usage overage.

[00144] **Figure 1** is a functional diagram illustrating a network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a two tier network embodiment is provided, including a Radio Access Network (RAN 405) and Access Transport Network (ATN 415). As those of ordinary skill in the art will appreciate, Figure 1 provides a simplified network functional architecture diagram with a reduced number of network elements to illustrate various embodiments for providing user notifications for DAS in a simplified manner. Also, to simplify the discussion, only one access network (RAN) 405 and one transport network (ATN) 415 are shown, but one of ordinary skill in the art will appreciate that multiple network connections to a given device service processor managed by a service controller can also be used in view of the various embodiments described herein. These changes are intended to simplify understanding of the embodiments described herein, and it will be apparent to one of ordinary skill in the art that the simplifications do not in any way limit the various embodiments for multi-tier networks, multi-technology networks with additional network elements as described herein or as common in the industry to provide additional functionality, or for providing a different architecture and/or allocation of network element functionality.

[00145] Referring to Figure 1, RAN Gateways 410 conduct and control traffic between RAN 405 networks and ATN 415 networks. In some embodiments, network element 4G/3G/2G Transport Gateways 420 conduct and control traffic between the ATN 415 networks, the carrier core network, and outside networks Data Services Accessed By Device 6520 and Voice Services Accessed By Device 6520. As shown, there are two instantiations of a service monitor function, usage monitor 130 and usage monitor 140, one instantiation shown on each of the two gateway network elements 4G/3G/2G Transport Gateways 420, shown as usage monitor 140, and RAN Gateways 410, shown as usage monitor 130. In some embodiments, the function of the service monitor function is to monitor service usage for the communications device 100. In some embodiments, service usage is monitored at a bulk or aggregate level. In some embodiments, service usage is monitored at a deeper level such as the various embodiments described herein for service activity usage classification. As shown, the service monitor functions are shown located in both gateway network elements, but as described herein in various other embodiments, the service monitor function can be included in only on one of the gateway elements, such as service usage monitor 130 and/or service usage monitor 140, on other network elements, and/or

on the device 100 (e.g., located in the service processor 115 and/or in a secure execution environment on device 100, such as within modem 124, a SIM, and/or a hardware/software partition of a processor of device 100). In some embodiments, service usage information is communicated from the gateway network elements to the Usage Report, Store 136 network element, and this element receives and aggregates the usage information from one or more network elements that have a service monitoring function that contributes to a service usage measurement. In some embodiments, the Trigger Event Detect 138 function inspects the record of service usage and identify when a pre-configured (e.g., pre-defined, pre-programmed, pre-stored, or provisioned) service usage notification trigger event detection criteria comes into existence that is intended to trigger a notification message sequence to be sent to the device end user UI. For example, various highly flexible service usage notification trigger event detection criteria and associated notification message sequences can be implemented using various embodiments as described herein. As shown, the Trigger Event Detect 138 function is located in the Usage Report, Store 136 network element, but in other embodiments described herein the Trigger Event Detect 138 function can be located in other network elements or in the device.

[00146] In some embodiments, device 100 includes a service processor 115 in communication with user interface 120 via agent communication bus 1630. In some embodiments, device 100 is in communication with the over the air network (e.g., via RAN 405 and so forth as shown in Figure 1), via modem 124. As shown, modem 124 is in communication with device networking stack 122 and TCP application 1604, IP application 1605, and voice application 1602, and/or various other application as would be apparent to one of ordinary skill in the art.

[00147] As shown, communications device 100 (e.g., a mobile wireless device/station) which includes/executes service processor 115 is in network communication via RAN 405 through RAN Gateways 410 and ATN 415 through 4G/3G/2G Transport Gateways 420 to access voice network services 6520 and data network services 6522 (e.g., various voice/data network services via cellular provider network(s) and/or the Internet as similarly described herein). Service Controller 122 communicates with various network elements and the device Service Processor 115 and the agents therein via the Service Control Device Link 1691 for, for example, programming notification policies and initiating notification message sequences as described herein. In some embodiments, the communication protocol for the communication between the

device and the required network elements (e.g., a service controller element, a service usage report and store element or another network element that performs similar functions) can have a number of communication protocols, including the protocol embodiments described herein or other protocols, such as TCP, SMS, SS7, and various other protocols as would be apparent to one of ordinary skill in the art. In some embodiments, Service Controller 122 functions as a programming agent to configure the device Service Processor 115 and the agents therein.

[00148] Also as shown, Service Processor 115 includes a Notification Agent 1697 and a Notification Message Sequence Store 1697A that are used for creating, compiling, initiating or managing the communication of the notification sequence with the device UI 120. The Notification Agent 1697 is in communication with other device agents, the UI 120 and the Service Control Device Link 1691 via the Agent Communication Bus 1630. In some embodiments, Service Controller 122 uses Notification Agent 1697 notification message sequence information or other Service Processor 115 agent program information from Notification Policy Management and UI 132 (e.g., or other equivalent network element for notification message provisioning and management) to provision (e.g., program, pre-configure, or download instructions to) the various elements of the notification system. In some embodiments, the Notification Policy Management and UI 132 (e.g., or other equivalent network element for notification message provisioning and management) provisions (e.g., program, pre-configures, downloads instructions to) the Notification Agent 1697 (e.g., and/or the Notification Message Sequence Store 1697A) to provide for new or modified notification message sequence information. In some embodiments, the Notification Policy Management and UI 132 provisions (e.g., programs, pre-configures, or downloads instructions to) the Trigger Event Detect 138 element (e.g., or Trigger Detect 138 element) to create, update, modify or remove a notification trigger detection criteria (e.g., the associated notification trigger index or notification trigger index message) as described herein. In some embodiments, the Notification Policy Management and UI 132 provisions (e.g., programs, pre-configures, or downloads instructions to) the Usage Monitor 140 element (and/or Usage Monitor 130 element). Various uses of the notification sequence information are described herein with respect to various embodiments. Service Controller 122 is also in communication with Service Provider IT Configuration Server 6515, which is in communication with the two gateway network elements 4G/3G/2G Transport Gateways 420 and RAN Gateways 410 and other network elements, and, in some embodiments,

facilitates configuring or programming the Trigger Event Detect 138 function with the service usage notification trigger event detection criteria that is intended to trigger a notification message sequence to be sent to the device UI (e.g., device end user UI).

[00149] As further shown in Figure 1, Notification Policy Management & UI 134 is in communication with the Service Controller 122 and, in some embodiments, facilitates programming notification policies for the various network elements as described herein. In some embodiments, Notification Policy Management & UI 134 is also connected to other network elements, such as the Service Provider IT Configuration Server 6515. In some embodiments, Notification Policy Management & UI 134 provides a user interface for a carrier network notification policy administrator in which the various programmable settings required for the Trigger Event Detect 134 function, the Notification Agent 1697, and other network or device elements is organized for the notification policy administrator in a manner that facilitates more effective notification policy design, provisioning, and/or enforcement as described herein.

[00150] In some embodiments, service provider IT/configuration server 6515 provisions Trigger Event Detect 138 function, located in the Usage Report, Store 136 network element, to monitor device 100 and detect when a service usage notification trigger detection criteria exists, associate it with a notification trigger index or notification trigger message, and communicate the notification trigger index or notification trigger message to the device Notification Agent 1697 via, using, or with the assistance of the Service Controller 122.

[00151] In some embodiments, push techniques, pull techniques, and/or various combinations thereof as described herein are used to provide user notifications for DAS as described herein with respect to various embodiments. In some embodiments, if device 100 is associated with a service plan that is a family plan and/or other shared account plan (e.g., a corporate or other shared account plan), account aggregation is performed by service provider IT/configuration server 6515 and usage count or other event notifications are pushed and/or pulled to service processor 115 (e.g., service usage synchronization can include an updated/current service usage for each user associated with a multi-user/shared account service plan, such as a family plan or corporate plan) as described herein with respect to various embodiments.

[00152] **Figure 2A** is a functional diagram illustrating another network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. Figure 2A is similar to Figure 1 in functionality, except that in Figure 2A the network architecture has been simplified to show the two-tier network including RAN 405, RAN Gateways 410, ATN 415, and Access Transport Gateways 420 as a single network referred to as Over The Air (OTA) Network 6505 with Home Agent (HA) 6510. These changes are intended to simplify understanding of the embodiments that follow, and it will be apparent to one of ordinary skill in the art that the simplifications do not in any way limit the various embodiments for multi-tier networks, multi-technology networks with additional network elements as described herein or as common in the industry to provide additional functionality not necessary for describing the embodiments, or for providing a different breakdown of network element functionality. As shown, device 100 which includes/executes service processor 115 is in network communication via OTA network communication 6505 to access voice/data network services 6520 (e.g., various voice/data network services via cellular provider network(s) and/or the Internet as similarly described herein). As described herein with respect to various embodiments, HA 6510 can have the functionality of Access Transport Gateways 420, a GGSN in GSM/UMTS/HSPA network, a gateway and server cluster such as an MME/SGW/PGW/PCRF/HSS(SPR) in an LTE network, a PDSN gateway with AAA server in an EVDO network, an IP/WiFi access point, and/or an access point controller. In some embodiments, some of the functionality described herein as being performed by the HA can be performed by some other network element/function that is behind the HA but is in the direct data path of the device 100 before it leaves the carrier network, such as in the case of a proxy gateway/server device that performs layer 3/4 or layer 7 inspection and control of traffic. As shown, usage Report, Store 136 is in communication with service processor 115 via Service Control Device Link 1691 as shown via HA 6510 and OTA network communication 6505. The Service Usage Monitor 140 function is located in the HA 6510 to facilitate monitoring of device service usage, which is reported to Usage Report, Store 136 network element.

[00153] As also shown in Figure 2A, Service Provider IT/Configuration Server 6515 is in communication with Usage Report, Store 136 network element and provides the service usage notification trigger event detection criteria programming for the Trigger Event Detect 138 function, which is located in the Usage Report, Store 136. Service Processor 115 includes a

Notification Agent 1697 and a Notification Message Sequence Store 1697A that are used for creating, compiling, initiating or managing the communication of the notification sequence with the device UI 120. The Notification Agent 1697 is in communication with other device agents, the UI 120, and the Service Control Device Link 1691 via the Agent Communication Bus 1630.

[00154] As further shown in Figure 2A, the provisioning path for programming the Notification Agent 1697 and the Notification Message Sequence Store 1697A is from the Notification Policy Management and UI 132 through the Service Provider IT/Configuration Server 6515. In some embodiments, the notification policy administrator UI, specification of the notification message sequence, specification of the service usage notification trigger event detection criteria, and specification of the notification trigger index or notification trigger message are all supported by the Notification Policy Management & UI 134, which is in communication with the Service Provider IT/Configuration Server 6515 which in turn is capable of performing the necessary provisioning and/or programming of the various network elements and device agents to facilitate implementation of the notification policy.

[00155] In some embodiments, the notification trigger index or notification trigger message is generated in the Trigger Event Detect 138 function which is located in the Usage Report, Store 136 network element and sent to the Notification Agent 1697 via the Service Control Device Link 1691.

[00156] In some embodiments, service processor 115 in communication with service controller 122 implements a network service usage notification trigger event with a specific index indicator, notification trigger index message, local device notification trigger index processing, and/or local off-line device display of user notifications for DAS as described herein. For example, service controller 122 (e.g., performing and/or facilitating real-time reporting or near-real-time reporting (RTR) functionality as described herein with respect to various embodiments) in coordination with HA 6510, which is in the data path and can monitor network service usage as described herein with respect to various embodiments, and/or in coordination with service provider IT/configuration server 6515 can monitor service usage and provide user notifications based on a service plan associated with mobile station 100 (e.g., user notification policies received from service controller 122) using various embodiments as described herein. In some embodiments, the HA 6510 monitors an aggregate measure of service usage for the device

as described herein. In some embodiments, the HA 6510 in coordination with service provider IT/configuration server 6515 monitors an aggregate measure of service usage for the device as described herein. In some embodiments, the HA 6510 (e.g., or another network element(s)) includes DPI functionality to monitor and account for network service usage at a more detailed level below the aggregate service usage amount for the device as described herein, including, in some embodiments, the ability to monitor and account for the service usage of various service activities as described herein. In some embodiments, the HA 6510, possibly in coordination with service provider IT/configuration server 6515, can monitor and account for the service usage at a more detailed level below the aggregate service usage amount for the device as described herein, including, in some embodiments, the ability to monitor and account for the service usage of various service activities as described herein. In some embodiments, service provider IT/configuration server 6515 provisions HA 6510 to monitor device 100 based on the service plan associated with device 100 (e.g., to monitor network service usage and report, such as to provide real-time or near-real-time reporting (RTR) to facilitate real-time or near-real-time and accurate usage count reporting or accurate within an acceptable margin of error/threshold, or other monitored usage based event reporting and/or notification based on the monitored network service usage). As used herein with respect to the present embodiment, the term near-real-time refers to a delay between actual service usage and a report on service usage such that over the delay period there is a relatively small percentage of a service usage as compared to a desired service usage threshold. For example, the service usage reporting delay can be small enough so that the service usage that takes place during the reporting delay is less than approximately 50% of the threshold, with the usage that takes place during the reporting delay ideally being less than approximately 15%. In some embodiments, the HA 6510, and/or the HA 6510 in coordination with service provider IT/configuration server 6515 can identify a events/thresholds, such as configured reporting events or policies for user notifications. In some embodiments, push techniques, pull techniques, and/or various combinations thereof as described herein are used to provide user notifications for DAS as described herein with respect to various embodiments. As an example, user notifications based on bulk service usage based on network based service usage monitoring performed by HA 6510 can be used to provide user notifications based on bulk service usage.

[00157] In some embodiments, a network service usage monitoring element, such as HA 6510 or HA 6510 in conjunction with an IT/configuration server 6515, is used for service usage monitoring; in which the service usage monitoring element is programmed to detect a pre-determined service usage notification trigger, in which the notification trigger is based on the occurrence of a service usage condition, the occurrence of a service usage event or the occurrence of a service usage pattern, in which the service usage monitoring element has a pre-defined association of the notification trigger with a pre-determined notification trigger index or notification trigger message, in which the trigger index is an identifier or a message that references a pre-determined service usage notification sequence stored on a device storage system or includes service usage notification information that will be combined with a pre-determined service usage notification sequence stored on a device storage system, and the service usage monitoring element sends the notification trigger index or notification trigger message to a network service controller element that communicates with the device, and the service controller element sends notification trigger index or notification trigger message to device for the purpose of initiating a service usage notification message sequence in the device UI. In some embodiments, the notification trigger index or notification trigger message contains only a portion of the notification message sequence information that is intended to be displayed in the device UI. In some embodiments, the notification trigger index is intended as an index to select a pre-determined notification sequence that is stored in the local device storage system. In some embodiments, the notification trigger message includes only a portion of the information that is intended to be displayed to the device UI with the remainder of the pre-determined notification sequence is stored in the local device storage system of device 100.

[00158] In some embodiments, a device notification agent is pre-configured on the device to include pre-determined notification sequence information, in which the notification sequence information corresponds to either (i) a notification trigger index in which the local notification sequence information includes all the information that is to be displayed to a UI, or (ii) a notification trigger message in which a portion of the information that is to be displayed to a UI is included in the local notification message sequence information and a portion of the information that is to be displayed to a UI is included in the notification index message, and the device notification agent is further pre-configured on the device to accept a notification trigger index or notification trigger message from a network element, such as a network element that

monitors service usage, for example, an HA or HA in conjunction with an IT/configuration server, and upon receipt of the notification trigger index or notification trigger message the notification agent either (i) uses the notification trigger index to create a notification message using the locally stored notification sequence information indexed by the notification trigger index to create a notification message sequence, or (ii) uses the notification trigger message in combination with the locally stored notification sequence information that is associated with the notification trigger message to create a notification message sequence, and the notification agent displays the notification sequence information on the device UI.

[00159] In some embodiments, the notification agent system selects a judicious partitioning of the notification message sequence information that is pre-stored on the device and the information that is either included in the notification trigger index or notification trigger message, or is obtained by the device notification agent as part of the notification agent process to assemble and display the notification sequence.

[00160] In some embodiments, the HA 6510, possibly in coordination with service provider IT/configuration server 6515, monitors service usage and creates a record, within the service usage record to identify a pre-determined service usage notification trigger event detection criteria, looks up a pre-determined service usage notification trigger index or notification trigger message that is associated with the specific notification trigger event detection criteria, and in coordination with the Service Controller 122 sends the service usage notification trigger index or notification trigger message to a device based notification agent that is local to the device for further local device processing of the trigger event message or message index prior to device UI display of an end user notification message.

[00161] In some embodiments, a service monitoring element (e.g., usage monitor 140 and/or other service usage monitoring elements in the network and/or on the device) performs service usage monitoring and communicates service usage to a service usage notification trigger detection element (e.g., Trigger Event Detect 138); service usage notification trigger detection element is programmed (e.g., programmed by Notification Policy Management & UI 134 and Notification Policy Management and UI 132, which can be in communication with Service Provider IT Configuration Server 6515 and/or Service Controller 122) to identify a service usage notification trigger event detection criteria, that occurs prior to a service plan limit being reached

or after a service plan limit being reached, by inspecting the service usage monitoring history to identify a pre-determined (e.g., pre-programmed) service usage condition or service usage pattern; service usage notification trigger detection element associates the notification trigger event detection criteria with a pre-determined notification trigger index or a notification trigger message; service usage notification trigger detection element communicates the notification trigger index or notification trigger message to a device notification agent for further local device processing by the notification agent for the purpose of displaying a notification message sequence.

[00162] In some embodiments, the service monitoring element is located in a network element (e.g., HA 6510). In some embodiments, the service monitoring element is located in a device agent on the device (e.g., Policy Implementation Agent 1690), and, in some embodiments, the service monitoring element is secured using various techniques described herein.

[00163] In some embodiments, the service usage notification trigger detection element is located in a network element (e.g., HA 6510 or Usage Report, Store 136 or MVNO Service Gateway/Server 292). In some embodiments, the service usage notification trigger detection element is a device agent located on the device (e.g., Service Monitor Agent 1696 or Policy Implementation Agent 1690).

[00164] These embodiments provide a general framework for service usage notification that can support identification of a wide variety of notification trigger event detection criteria with a wide variety of associated notification message sequences, and provide various techniques for communicating the associated notification trigger indexes or notification trigger messages to a device notification agent to cause the notification message sequences to be delivered to the device UI. For example, while various embodiments described here provide for powerful and flexible user notifications for DAS, the user notification message sequences can be generated and delivered in a manner that can also be more efficient in terms of network resource utilization and/or faster than the time required to display a user notification of similar complexity using conventional techniques. The flexibility to support a wide range of notification trigger event detection criteria and the associated notification message sequences results from the ability to locate the notification Trigger Event Detect 138 function in various network elements or device

agents and to program the service usage notification trigger event detection criteria in an efficient manner using the notification system policy management embodiments disclosed herein. The network resource savings and/or time savings results when the system is optimized to include as much information as possible in the pre-stored notification message sequence information in the device notification message sequence store 1697A. This allows notification message sequences to be effectively delivered to the device UI that would be impractical due to either the complexity in detecting them or the verbosity in communicating them via conventional self contained SMS messages or web site pages. Accordingly, various embodiments described herein provide for many types of notification message sequences to be delivered to a device UI that provide for improved user awareness of service usage status or service options, and provide carriers with the means to inform the user when a service plan is available for a device service usage activity being attempted by the user, or when a more suitable service plan is available for a desired service usage activity or set of service usage activities. In this manner, user notification messages that would, for example, typically consume a relatively large amount of network over the air bandwidth or resources to communicate to the end user, or would typically require a more time consuming or complex message transaction process, can be communicated with less delay or with lower over the air network bandwidth or resource consumption.

[00165] In some embodiments, the notification trigger event detection criteria identifies one or more of the following service usage conditions and/or events: a pre-determined intermediate service usage amount or service usage level that is less than a service plan service usage limit; a service usage amount or service usage level that is more than a service plan service usage limit; a pre-determined level of service usage velocity; a pre-determined level of service usage velocity that is relatively high or relatively low compared to a service plan usage limit; a service usage activity that is not supported by the current service usage plan policies; a specific pre-determined application or group of applications attempting to use service or reaching a pre-determined level of service usage; a specific pre-determined application or group of applications attempting to use service or reaching a pre-determined level of service usage, in which the application or group of applications typically exhibit usage behavior that is relatively high with respect to service plan limits; a service usage activity attempting to communicate with or communicating with a pre-determined network destination or group of destinations; a service usage activity attempting to communicate with or communicating with a pre-determined network

destination or group of destinations, in which the typical service usage for devices connected to the destination or group of destinations is relatively high compared to a service plan limit; a service usage activity for which an alternative service plan is available or better configured to support; a service usage activity for which an alternative network is available or better able to support; a service usage activity or group of services usage activities attempting to use service or reaching a pre-determined level of service usage during a pre-determined time of day, during a time that the network is experiencing a pre-determined level of congestion, or during a time that the network is experiencing a pre-determined level of performance or availability; a service usage activity that a service usage activity that attempts to communicate with or communicates with the network with a specified QoS level; a service usage activity that attempts to communicate via the network with a specified QoS level that is not available under the access policies of the current service plan or due to network congestion; a service usage activity that attempts to communicate with or does communicate with a roaming network; a service usage amount of a specified level is reached on a roaming network; a service usage activity that attempts to communicate with an unauthorized network or network destination; an aggregate service usage amount for a group of devices that belong to a user group or device group plan; a specific set of service usage activities for a device that belongs to a group service plan, in which the device group manager has identified the service usage activities for notification message actions; and various other service usage conditions and/or events as will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein. It will now be apparent to one of ordinary skill in the art that a wide range of service usage notification trigger event detection criteria can be designed and implemented, associated with an arbitrarily sophisticated user notification sequence, in which the user notification sequence is divided or partitioned into components that are stored or programmed locally on a communications device to reduce network notification message communication overhead and improve the notification message sequence delivery performance and process.

[00166] In some embodiments, the device notification agent is pre-configured to maintain a local device storage of one or more pre-determined sets of notification sequence information, each set defining at least a portion of the information required to generate a UI notification message sequence; the local storage of notification sequence information is organized so that a

specific desired set of notification sequence information is determined by a notification trigger index or notification trigger message; the notification agent receives the notification trigger index or notification trigger message from a notification trigger detection element; and the notification agent creates a complete notification message sequence by performing one or more of the following operations:

- a. initiates (e.g., generates, assembles, executes, or manages) a notification message sequence by using the notification trigger index to look up a pre-stored set of message sequence information (e.g., after adding additional information or additional formatting, such as adding a UI background bitmap that is common to multiple notification message sequences);
- b. initiates a notification message sequence by using the notification trigger message to look up a pre-stored set of message sequence information (e.g., notification information, UI bitmap, and/or UI formatting) and combining the pre-stored information with information included in the notification trigger message (e.g., usage count update, service plan usage condition or status, and/or specific service usage activity information) to form a complete notification message sequence;
- c. initiates a notification message sequence by using the notification trigger index or trigger message information as a reference to initiate a notification message sequence based on information stored on a network element (e.g., pull down a particular set of message sequence information from a server or initiate/redirect a user to a particular portal or website message sequence, such as a series of web pages with options); or
- d. perform a combination of two or more of the above operations; and the device notification agent communicates with a device UI to provide the notification message sequence to the device user.

[00167] In some embodiments, the service usage notification trigger detection element is a network element. In some embodiments, the service usage notification trigger detection element is a device agent located on the device.

[00168] In some embodiments, as similarly described herein with respect to various embodiments, a user notification message sequence is initiated (e.g., generated, assembled, executed, or managed) by using the notification trigger index to look up a pre-stored set of message sequence information (e.g., possibly after adding additional information or additional formatting, such as adding a UI background bitmap that is common to multiple notification message sequences). For example, the notification trigger index can include various additional information for a user notification for when a service usage condition detection indicates that the service usage is outside of the associated service plan for the communications device, such as a warning message and/or an offer for alternative service plan options. As will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein, various user notification message sequences can be initiated by using the notification trigger index to look up a pre-stored set of message sequence information. In some embodiments, the user notification generates one or more user notification messages, sequences of messages, and/or messages requiring user input and/or confirmation (e.g., user acknowledgement of receipt of the user notification message and/or user approval to proceed with a certain service usage activity based on a notification of cost and/or service usage implications).

[00169] In some embodiments, as similarly described herein with respect to various embodiments, a complete user notification message sequence is initiated by using the notification trigger index to look up a pre-stored set of message sequence information (e.g., possibly after adding additional information or additional formatting, such as adding a UI background bitmap that is common to multiple notification message sequences), and combining the pre-stored information with information included in the notification trigger message (e.g., usage count update, service plan usage condition or status, specific service usage activity information, and/or other service usage/condition/event/other information) to form a complete notification message sequence. For example, the notification trigger index can include various additional information for a user notification for when a service usage condition detection indicates that the service usage is outside of the associated service plan for the communications device, such as a warning message, a summary of the service usage that is outside of the service plan (e.g., usage count update, service plan usage condition or status), and/or an offer for alternative service plan options. As will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein, various user notification message sequences

can be initiated by using the notification trigger index to look up a pre-stored set of message sequence information and combining the pre-stored information with information included in the notification trigger message.

[00170] In some embodiments, a complete user notification message is generated, initiated or managed using the notification trigger index or trigger message information as a reference to initiate a notification message sequence based on information stored on a network element (e.g., pull down a particular set of message sequence information from a server or initiate/redirect a user to a particular portal or website message sequence, such as a series of web pages with options). For example, a local device stored notification message sequence managed by notification agent can be instructed by a notification trigger index or notification trigger message to branch out and request (e.g., pull) information from a network element (e.g., a portal, a website, and/or a download server) to add to the notification message. In some embodiments, only a relatively small portion/subset of the information included in the notification message sequence is received from the network element, thus, still conserving OTA resources (e.g., OTA bandwidth) and improving notification real-time response speed. In some embodiments, where it is not practical, efficient, or desired, then a relatively large portion or all of the notification message sequence can be derived from the network element (e.g., one or more network elements).

[00171] In some embodiments, the notification message sequence provides the user with one or more of the following notification information set types and/or action option types: informs the user of a usage amount for bulk (e.g., open access) usage that is over a service plan limit or under the service plan limit; informs the user of a usage amount for a detailed service usage classification that is other than bulk; informs the user of a service usage activity that is either not allowed by the current service plan policy configuration or is traffic controlled under the current service plan policy configuration; informs the user of the reason that a service usage activity is either allowed, not allowed or is traffic controlled under the current service plan policy configuration; informs the user of the reason that a service usage activity is either allowed, not allowed or is traffic controlled under the current service plan policy configuration including for example service policies that are dependent on classification of service usage activity, time of day, network congestion state, network type, roaming versus home network connection, QoS level or QoS availability; informs the user of the service usage velocity compared to a service

plan limit, or provides the user with an indication of the relative fit for the service plan for a service usage velocity or typical service activity usage pattern; provides the user with optional service plans; detects service usage patterns and provides the user with a service plan option that is suited for the service usage pattern; detects when network access is being attempted but is not available, and provides the user with an option to select a service plan for an available network; indicates when a service plan may be better suited for a given usage velocity or service activity type as compared to the current service plan; accepts user input on selecting an initial service plan, reconfiguring a service plan or changing a service plan; informs a user of a device that belongs to a user group or device group usage plan that a certain aggregate usage amount has been reached for the device group or user group; informs a user of a device that belongs to a user group or device group usage plan that a specific set of service usage activities for a given device or user that belongs to the group service plan have occurred, in which the device group manager has identified the service usage activities for notification message actions; and various other notification information set types and/or action option types as will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein.

[00172] In some embodiments, the notification message sequence provides the user with one or more of the following notification information sets and/or user action options: inform the user that an intermediate service usage amount or service usage level that is less than a service plan service usage limit has been reached; inform the user that an intermediate service usage amount or service usage level that is less than a service plan service usage limit has been reached and provide user with alternatives to modify service plan policy configuration or alternatives to change service plan; inform the user that a service usage amount or service usage level that is more than a service plan service usage limit has been reached; inform the user that a service usage amount or service usage level that is more than a service plan service usage limit has been reached and provide user with (i) an overage acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a level of service usage velocity has been reached; inform the user that a level of service usage velocity that is relatively high or relatively low compared to a service plan usage limit has been reached; inform the user that a level of service usage velocity has been reached and provide user with (i) a high velocity acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a service

usage activity is attempting to receive or has received service and is not supported by the current service usage plan policies; inform the user that a service usage activity is attempting to receive or has received service and is not supported by the current service usage plan policies (e.g., associated service plan) with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a service usage activity that is not supported by the current service usage plan policies has been blocked; inform the user that a service usage activity that is not supported by the current service usage plan policies has been blocked and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan in order to allow the service usage by the activity; inform the user that a an application or group of applications are attempting to use service or have reached a pre-determined level of service usage; inform the user that a an application or group of applications are attempting to use service or have reached a pre-determined level of service usage and provide the user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that an application or group of applications that that under the current service plan policies have been blocked, allowed, or placed on traffic controlled access (e.g., throttled, backgrounded, provided with QoS); inform the user that an application or group of applications that that under the current service plan policies have been blocked, allowed, or have been placed on traffic controlled access (e.g., throttled, backgrounded, provided with QoS) and also provide information to the user explaining why the access has been blocked; inform the user that an application or group of applications that under the current service plan policies have been blocked, allowed, or have been placed on traffic controlled access (e.g., throttled, backgrounded, provided with QoS) and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration to override the access controls, or (iii) alternatives to change service plan in order to allow the service usage by the activity; inform the user that an application or group of applications are attempting to use service or have reached a pre-determined level of service usage or service usage velocity, and informs the user that the application or group of applications typically exhibit usage behavior that is relatively high with respect to service plan limits; inform the user that an application or group of applications are attempting to use service or have reached a pre-determined level of service usage or service usage velocity, and informs the user that the application or group of

applications typically exhibit usage behavior that is relatively high with respect to service plan limits and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a service usage activity is attempting to communicate with or has communicated with a specified network destination or group of specified destinations; inform the user that a service usage activity is attempting to communicate with or has communicated with a specified network destination or group of specified destinations that have been blocked, allowed, or placed on traffic controlled access; inform the user that a service usage activity is attempting to communicate with or has communicated with a specified network destination or group of specified destinations and under the current service usage plan policies the destinations have been blocked or have been placed on traffic controlled access and also provide information to the user explaining why the access has been blocked or placed on traffic controlled access; inform the user that a service usage activity is attempting to communicate with or has communicated with a specified network destination or group of specified destinations and under the current service usage plan policies the destinations have been blocked, allowed or have been placed on traffic controlled access and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration to over-ride the access controls, or (iii) alternatives to change service plan in order to allow the service usage by the activity; inform the user that a service usage activity that communicates with a specified network destination or group of specified network destinations has reached a pre-determined level of service usage or service usage velocity, and informs the user that service usage activities communicating with the specified network destinations typically exhibit usage behavior that is relatively high with respect to service plan limits; inform the user that a service usage activity that communicates with a specified network destination or group of specified network destinations has reached a pre-determined level of service usage or service usage velocity, and informs the user that service usage activities communicating with the specified network destinations typically exhibit usage behavior that is relatively high with respect to service plan limits and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a service usage activity is attempting to communicate with or has communicated with the network, and further inform the user that there is an alternative service plan that is better configured to support the activity; inform the user that

a service usage activity is attempting to communicate with or has communicated with the network, and further inform the user that an alternative network (e.g., 2G, 3G, 4G or WiFi) is available to support the service activity; inform the user that a service usage activity is attempting to communicate with or has communicated with the network, and further inform the user that an alternative network (e.g., 2G, 3G, 4G or WiFi) is available that is better able to support the activity and under the current service usage plan policies the service usage activities have been blocked, allowed, or have been placed on traffic controlled access; inform the user that a service usage activity is attempting to communicate with or has communicated with the network, and further inform the user that an alternative network (e.g., 2G, 3G, 4G or WiFi) is available that is better able to support the activity and under the current service usage plan policies the service usage activities have been blocked, allowed, or have been placed on traffic controlled access, and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service during a specified time of day, during a time that the network is experiencing a specified level of congestion, or during a time that the network is experiencing a specified level of performance or availability; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service during a specified time of day, during a time that the network is experiencing a specified level of congestion, or during a time that the network is experiencing a specified level of performance or availability, and under the current service usage plan policies the service usage activities have been blocked, allowed or have been placed on traffic controlled access; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service during a specified time of day, during a time that the network is experiencing a specified level of congestion, or during a time that the network is experiencing a specified level of performance or availability, and under the current service usage plan policies the service usage activities have been blocked, allowed or have been placed on traffic controlled access, and provide user with (i) an acknowledgement message, (ii) alternatives to modify service plan policy configuration, or (iii) alternatives to change service plan; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service with a specified QoS level; inform the user that a service usage activity or group of

services usage activities are attempting to use service or have used service with a specified QoS level and that under current network service plan policies the QoS level is not available or is available; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service with a specified QoS level and that under current network service plan policies the QoS level is not available or is available and provide the user with (i) an option to accept QoS service and/or QoS service charges, (ii) alternatives to modify service plan QoS policy configuration, or (iii) alternatives to change QoS service plan; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service involving connection to a roaming network; inform the user that a service usage activity or group of services usage activities have reached a specified level of service usage involving a connection to a roaming network; inform the user that a service usage activity or group of services usage activities are attempting to use service or have used service involving connection to a roaming network and under current service plan policies roaming network access has been allowed, blocked, or access controlled; inform the user that service usage is possible via one or more roaming networks, and provide the user with information about the service usage charges, service access policies or service access performance of one or more of the networks; inform the user that service usage is possible via one or more roaming networks, and provide the user with an option to connect to a roaming network; inform the user that a service usage activity that attempts to communicate with an unauthorized network or network destination that is not allowed due to security policies; inform the user that a given level of aggregate usage has occurred on a family plan device group; inform the user that a given level of aggregate usage has occurred on a multi-device plan; inform a parent in a family plan that a specific set of service usage activities for a given device or user that belongs to the group service plan have occurred, in which the device group parent has identified the service usage activities for notification message actions; inform an administrator for an enterprise device group that a specific set of service usage activities for a given device or user that belongs to the group service plan have occurred, in which the administrator has identified the service usage activities for notification message actions; and various other notification information sets and/or user action options as will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein.

[00173] In some embodiments, user notifications for DAS includes providing various marketing interceptors. In some embodiments, market interceptors include various user notifications (e.g., user notification messages or user notification message sequences) that include offers for services, service plan upgrades or new service plans, or various forms of marketing or advertising information. For example, market interceptors can provide effective up sell and marketing opportunities for service providers (e.g., mobile services/cellular carriers) to market services in devices that may start out with minimal or lower cost service plan limits or only have sponsored services. As described herein with respect to various embodiments, user notification messages/message sequences can include various types of market interceptors (e.g., offer to upgrade a service plan or add a new service plan option). For example, when a service usage attempt is detected that is not supported by a current associated service plan, a notification trigger event can be programmed to provide a user notification message sequence that offers a new service plan or a different service plan to the user.

[00174] **Figure 2B** is a functional diagram illustrating another network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. Figure 2B is similar to Figure 2A in functionality, except that in Figure 2B the HA 6510 includes both the Trigger Event Detect 138 function and the Service Monitor Function, usage monitor 140.. In some embodiments, providing both the Trigger Event Detect 138 function and the Service Monitor Function, usage monitor 140 on the HA 6510 can facilitate a deeper level of service usage notification trigger event detection criteria if the HA 6510 has, for example, deep packet inspection (DPI) capabilities. In some embodiments, service usage notification trigger event detection criteria are specified and implemented for finer classification of service usage than aggregate or bulk usage counts. For example, service usage can be monitored based on network/sub network, sponsored services, application (e.g., application specific services that use certain network destinations), allocation for corporate enterprise sponsored traffic versus end user billed traffic, and various other service usage monitoring techniques and classifications as described herein with respect to various embodiments. In some embodiments, the various network elements and device agents that are programmed in a coordinated manner to deliver the proper notification message sequence to the device UI when the service usage notification trigger event detection criteria come into existence are provisioned via the Service Provider IT/Configuration Server 6515 in communication with the Notification

Policy Management UI 132 as similarly described above with respect to Figure 2A. In some embodiments, the notification trigger index or notification trigger message is generated in the Trigger Event Detect 138 function, which is located in the Usage Report, Store 136 network element and sent to the Notification Agent 1697 via the Service Control Device Link 1691.

[00175] In some embodiments, service provider IT/configuration server 6515 provisions HA 6510 to monitor device 100 based on the service plan associated with device 100 (e.g., to monitor network service usage and report, such as to push real-time reporting (RTR) of usage and/or notification events, based on the monitored network service usage and/or events/thresholds, such as configured reporting events or policies for user notifications) to service provider IT/configuration server 6515. In some embodiments, push techniques, pull techniques, and/or various combinations thereof as described herein are used to provide user notifications for DAS as described herein with respect to various embodiments. In some embodiments, if device 100 is associated with a service plan that is a family plan and/or other shared account plan (e.g., a corporate or other shared account plan), account aggregation is performed by service provider IT/configuration server 6515 and usage count or other event notifications are pushed and/or pulled to service processor 115 (e.g., service usage synchronization can include an updated/current service usage for each user associated with a multi-user/shared account service plan, such as a family plan or corporate plan) as described herein with respect to various embodiments.

[00176] In some embodiments, the service controller 122 is in secure communication with the service processor notification agent 1697 for providing user notifications for DAS as described herein with respect to various embodiments. In some embodiments, service provider IT/configuration server 6515 is in secure communication with service controller 122 for configuring the service controller 122. For example, service provider IT/configuration server 6515 can provide a service plan and/or service plan update, service policy, and/or service policy update, which can each include notifications for DAS based on service usage.

[00177] In some embodiments, it is desirable to generate the service usage notification trigger indexes or messages on the device. For example, generating the service usage notification trigger indexes on the device can provide for a more flexible, more easily

programmed implementation of user notifications for DAS, and, in some cases, network monitoring may not have the capability to generate triggers.

[00178] In some embodiments, network based service usage information is communicated to the device where it is processed and, in some cases, stored, and the network based service usage information is used for generating notification trigger indexes or trigger messages. In some embodiments, device based service usage monitoring is used as the basis for trigger event generation on the device. In some embodiments, network based service usage information and device based service usage information is used as the basis for trigger event generation on the device. In some embodiments, the device based service usage information is synchronized with network based service usage information using various techniques as described herein with respect to various embodiments, and the synchronized service usage information is used as the basis for generating trigger indexes or trigger messages.

[00179] Accordingly, in some embodiments, a network service usage monitoring element, such as an HA or HA in conjunction with an IT/configuration server, is used for service usage monitoring; in which the service usage monitoring is communicated to the device service usage notification agent; the service usage notification agent is programmed to detect a pre-determined service usage notification trigger; in which the notification trigger is based on the occurrence of a service usage condition, the occurrence of a service usage event or the occurrence of a service usage pattern; in which the device service usage notification agent has a pre-defined association of the notification trigger with a pre-determined notification trigger index or notification trigger message; in which trigger index is an identifier or a message that references a pre-determined service usage notification sequence stored on a device storage system or contains service usage notification information that will be combined with a pre-determined service usage notification sequence stored on a device storage system; the device notification agent is pre-configured on the device to include pre-determined notification sequence information, in which the notification sequence information corresponds to either (i) a notification trigger index in which the local notification sequence information includes all the information that is to be displayed to a UI, or (ii) a notification trigger message in which a portion of the information that is to be displayed to a UI is included in the local notification message sequence information and a portion of the information that is to be displayed to a UI is included in the notification index message; and the notification agent displays the notification sequence information on the device UI.

[00180] **Figure 2C** is a functional diagram illustrating another network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. Figure 2C is similar to Figure 2B in functionality, except that in Figure 2C the Trigger Event Detect 138 function is implemented by the service processor 115, as shown at the service monitor agent 1696, on the device 100. As also shown, a Service Controller 122 is provided in the network to manage notification message communication and notification policy programming of the device service processor 115 and various agents of the service processor. In particular, an additional agent has been added to the device service processor 115 as shown, service monitor agent 1696. In some embodiments, the Service Monitor Agent 1696 accepts service usage information reported to the device by the Usage Report, Store 136 network element via the Service Controller 122. This provides the device 100 with a record of service usage that can be used to detect service usage notification trigger event detection criteria. As shown, the Trigger Event Detect 138 function is located in the Service Monitor Agent 1696. In some embodiments, when a service usage notification trigger index or notification trigger message is generated by the Service Monitor Agent 1696, it is sent directly to the Notification Agent 1697 for notification message sequence processing.

[00181] In some embodiments, service processor notification agent 1697 in communication with service controller 122 implements device based user notifications for DAS as described herein with respect to various embodiments. For example, service processor 115 can monitor service usage and provide user notifications based on a service plan associated with device 100 (e.g., user notification policies received from service controller 122 and/or in coordination with a provider IT/configuration server 6515) using various embodiments as described herein. In some embodiments, push techniques, pull techniques, and/or various combinations thereof as described herein are used to provide user notifications for DAS as described herein with respect to various embodiments. As an example, user notifications based on bulk service usage based on device based service usage monitoring performed by service processor 115 can be used to provide user notifications based on bulk service usage.

[00182] **Figure 2D** is a functional diagram illustrating another network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. Figure 2D is similar to Figure 2C in functionality, except that in Figure 2D, the device service processor 115 also includes a device Policy Implementation Agent 1690. In some

embodiments, the Policy Implementation Agent 1690 interacts with the device networking stack 122 to detect and monitor device service usage as described herein with respect to various embodiments. As shown, the Service Monitor 140 function is located in the Policy Implementation Agent 1690. In some embodiments, the service usage information is communicated over the agent communication bus 1630 to the Service Monitor Agent 1696 in which the Trigger Event Detect 138 function identifies service usage notification trigger event detection criteria and initiates the user notification sequence by communicating the notification trigger index or notification trigger message to the Notification Agent 1697.

[00183] In some embodiments, a device service usage monitoring agent, such as one of or a combination of a service monitor agent and a policy implementation agent, is used for service usage monitoring; in which the service usage monitoring is communicated to the device service usage notification agent; the service usage notification agent is programmed to detect a pre-determined service usage notification trigger; in which the notification trigger is based on the occurrence of a service usage condition, the occurrence of a service usage event or the occurrence of a service usage pattern; in which the device service usage notification agent has a pre-defined association of the notification trigger with a pre-determined notification trigger index or notification trigger message; in which trigger index is an identifier or a message that references a pre-determined service usage notification sequence stored on a device storage system or includes service usage notification information that will be combined with a pre-determined service usage notification sequence stored on a device storage system; the device notification agent is pre-configured on the device to include pre-determined notification sequence information, in which the notification sequence information corresponds to one of: (i) a notification trigger index in which the local notification sequence information contains all the information that is to be displayed to a UI, (ii) a notification trigger message in which a portion of the information that is to be displayed to a UI is included in the local notification message sequence information and a portion of the information that is to be displayed to a UI is included in the notification index message, (iii) ; and the notification agent displays the notification sequence information on the device UI. In some embodiments, the device service usage monitoring agent service usage records are synchronized with network service usage records in a way that minimizes the difference between the two service usage sources.

[00184] In some embodiments, service processor notification agent 1697 and a device based Usage Monitor 140 in communication with service controller 122 implements a device based user notifications for DAS as described herein. For example, service processor 115 can monitor service usage and provide user notifications based on a service plan associated with device 100 (e.g., user notification policies received from service controller 122 and/or in coordination with a provider IT/configuration server 6515) using various embodiments as described herein. In some embodiments, push techniques, pull techniques, and/or various combinations thereof as described herein are used to provide user notifications for DAS as described herein with respect to various embodiments. As an example, user notifications based on bulk service usage based on device based service usage monitoring performed by service processor 115 can be used to provide user notifications based on bulk service usage.

[00185] **Figure 2E** is a functional diagram illustrating another network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. Figure 2E is similar to Figure 2D in functionality, except that in Figure 2E, two Service Usage Monitor 140 functions are provided as shown, a network based service usage monitor on the HA 6510 and a device based service usage monitor on the Policy Implementation Agent 1690. As described herein with respect to various embodiments, this approach provides for service usage measurements on the device that accurately represent real-time or near real-time device service usage, and can have a service usage classification that is different than, and in some cases, better than or complimentary to the service usage classification that is available in the network (e.g., application based service usage classification can be provided using device based service usage monitoring techniques as described herein with respect to various embodiments). In some embodiments, the network based service usage measure is synchronized with the device based service usage measure as described herein with respect to various embodiments. In some embodiments, the network based service usage measure is used to secure the notification system as described herein with respect to various embodiments. In some embodiments, the device based service usage measure is verified using the network based service usage measure as described herein with respect to various embodiments.

[00186] In some embodiments, service processor 115 in communication with service controller 122 implements a hybrid device/network based user notifications for DAS as described herein. For example, certain user notifications for DAS functionality can be

implemented using device based techniques as described herein and various other user notifications for DAS functionality can be implemented using network based techniques as described herein. In some embodiments, push techniques, pull techniques, and/or various combinations thereof as described herein are used to provide user notifications for DAS as described herein with respect to various embodiments. As an example, user notifications based on bulk service usage based on network based service usage monitoring performed by HA 6510 that is used to periodically synchronize a local bulk service usage measure maintained on the mobile station 100, and the local bulk service usage measure can be used to provide user notifications based on bulk service usage. As another example, service processor 115 can supplement the local bulk service usage measure based on device based service usage monitoring in between periodic network based service usage synchronizations. As yet another example, local service usage measures are maintained for one or more services and/or applications as described herein with respect to various embodiments. As a further example, various user notifications (e.g., reporting network service usage, cost of network service usage, and/or new service plan/upgrade options) can be provided based on local bulk service usage measures and/or other local service usage measures as described herein with respect to various embodiments.

[00187] **Figure 2F** is a functional diagram illustrating another network architecture for providing user notifications for device assisted services (DAS) in accordance with some embodiments. Figure 2F is similar to Figure 2E in functionality, except that in Figure 2F, the Trigger Event Detect 138 function is provided by the Policy Implementation Agent 1690 as shown. In some embodiments, this approach provides a wider range of classification capabilities for service usage notification trigger event detection criteria that can in turn be used to generate a wider range of end user notification message sequences that have more detail about service usage or service activity policies. For example, service usage notification message sequences can be generated that include information about the service usage state, access service policy state, and/or service plan state for specific applications or network destinations.

[00188] **Figure 2G** is a functional diagram illustrating a network architecture for an MVNO solution for providing user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a service Usage Monitor 140 function and a Trigger Event Detect 138 function that are in communication with Service Controller 122 are integrated into an MVNO network element, MVNO Service Gateway/Server 292, capable of

monitoring device 100 service usage, identifying a service usage notification trigger event detection criteria, and creating a service usage notification trigger index or notification trigger message. In some embodiments, user notification for DAS operates in a similar manner to the previously described embodiments except that the service usage monitoring and notification triggering are implemented and, in some embodiments, managed in the MVNO network. In some embodiments, the second service Usage Monitor 140 function, shown at HA 6510, is typically used for carrier service usage billing and/or reconciliation with the MVNO Usage Monitor 140 function reported service usage.

[00189] **Figure 3** is a functional diagram illustrating another network architecture for an MVNO solution for providing user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an MVNO service notification system embodiment is provided that is similar in operation to the carrier service notification system embodiment shown in Figure 2E.

[00190] **Figure 4A** is a functional diagram illustrating another network architecture for an MVNO solution for providing user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an MVNO service notification system embodiment is provided in which the service processor functionality is directly integrated into an application. In some embodiments, the device based service Usage Monitor 140 function, the Trigger Event Detect 138 function, and the function of the Notification Agent 1697 are integrated into Application 1604 in the form of the Notification, Usage Monitor and Trigger Detect Function 294 as shown. In some embodiments, these application functions operate in the system in the same manner as their counterparts, Usage Monitor 140 function, the Trigger Event Detect 138 function, and Notification Agent 1697, which are located outside of the application in the various embodiments discussed herein. For example, by locating these functions in an application, an application developer can directly control service usage notification and service plan status notification for an application without needing to control service usage and service plan status notification for the entire device. In some embodiments, application based service plans are provided using this approach in which access network service is provided to one or more applications on a device that has different access service or service usage policies than other applications on the device.

[00191] Given the sophistication of certain of the service usage notification embodiments provided herein, it can be difficult for a network administrator to define higher level service usage notification policies and transform those policies into the lower level programming, configurations, instructions or commands required to properly implement the higher level notification policies in the various network elements, such as an HA or HA in conjunction with an IT/configuration server. While the embodiments provided herein provide the potential for significant improvements in the real time effectiveness, speed, accuracy, sophistication, and user friendliness of service usage notification, advancements are highly desirable in the areas of policy definition and management tools to manage the definition of higher level service notification policy, transformation of the higher level policies into the required lower level network element configurations or device configurations required to implement the policy, and distribution of the lower level configurations to network elements or devices. Accordingly, in some embodiments, simplified provisioning of the network apparatus or device apparatus used to create a service policy using the above notification system embodiments is provided by a service notification system provisioning element, referred to as the notification policy management & UI 132. In some embodiments, the policy management & UI 132 programs the network service usage monitoring element with the notification trigger event detection criteria. In some embodiments, the policy management & UI 132 programs the network service usage monitoring element with the association between the notification trigger event detection criteria and the notification trigger index or notification trigger message. For example, the programming protocols and programming messages for the service usage monitoring element can be complex and non-intuitive for a network administrator, which this can complicate or slow the process of correctly implementing the service usage monitoring element commands, configuration or programming to properly implement a higher level definition of service policy defined by a network administrator, service policy designer or service plan designer. Accordingly, in some embodiments, policy management & UI 132 element includes a UI that allows a network administrator to define the notification trigger event detection criteria as higher level service usage trigger event detection criteria, service usage events or service usage patterns; and the policy management & UI 132 element converts these higher level definitions for the notification trigger event detection criteria into the appropriate lower level programming messages, instructions, commands or configurations that are recognized by or required by the service usage

monitoring element and that properly implement the intention of the higher level service usage trigger event detection criteria (e.g., higher level trigger event detection criteria, such as application based service usage limits, and lower level trigger event detection criteria, such as bulk service usage limits).

[00192] In some embodiments, policy management & UI 132 element includes a UI that allows a network administrator to define the association between the higher level service usage trigger event detection criteria and the intended corresponding notification trigger index or notification trigger message; and policy management & UI 132 element includes the intended association between the higher level service usage trigger event detection criteria and the intended corresponding notification trigger index or notification trigger message in the lower level programming of the service usage monitoring element. To further simplify the correct programming of the service usage monitoring element to properly implement service usage notification policy, in some embodiments, the policy management & UI 132 provides a mechanism for a network administrator to simultaneously define the notification triggers as higher level service usage conditions, and to define the association between the notification trigger event detection criteria and the intended corresponding notification trigger index or notification trigger message.

[00193] Similar to the difficulties facing a network administrator in transforming higher level service usage notification policies into the required programming and provisioning of the network service usage monitoring element, the process of pre-configuring, programming or pre-loading the local device storage of service usage notification message sequences can be complex, time consuming, and prone to error. A network administrator responsible for creating the proper notification policy definition and enforcement for the device and the network can benefit from a higher level UI tools to manage design of message sequences, associating of message sequences to the corresponding notification trigger event detection criteria and distribution of the correct pre-stored notification message sequence information to devices in a manner that properly associates the pre-stored notification message sequence information with the proper notification trigger index or notification trigger message to be received from the network. Accordingly, in some embodiments, the policy management & UI 132 element programs a local device notification agent storage system with one or more pre-determined notification message

sequences that are stored locally on the device, and to associate the notification sequences with a notification trigger index or notification trigger message to be received from the network.

[00194] In some embodiments, policy management & UI 132 element is included in the notification system, in which the UI accepts carrier network administrator inputs to define, design, specify or provide a reference to the following notification information: (i) the desired notification trigger event detection criteria, (ii) the notification trigger index or trigger message associated with the notification trigger event detection criteria, (iii) the notification message sequence that is to be associated with the notification trigger event detection criteria; and this notification information defined, designed, specified, or referenced by the administrator UI is passed to the service notification provisioning apparatus, which then (iv) programs the programmable notification Trigger Event Detect element 138 (e.g., which in the various embodiments described herein can be programmed within network elements or within device agents) with the notification trigger event detection criteria and trigger index or trigger message (e.g., which is the message sent by the notification Trigger Event Detect element 138 to indicate that the specific notification trigger event has occurred), (v) if required programs the routing of the trigger index or trigger message to the device notification agent 1697, (vi) programs the notification message sequence store 1697A, and, in some embodiments, the device notification agent 1697, with (a) an ordered list of notification message sequence actions (e.g., the sequence of actions to display any required notification message sequence information stored on the device and/or actions to display any notification message sequence information obtained from network elements), and (b) any required notification message sequence information that is stored locally on the device to initiate and complete the desired notification message sequence when the trigger index or trigger message is received.

[00195] In some embodiments, the policy management & UI 132 pre-configures the device notification agent to maintain a local device storage (e.g., in various embodiments one or more of notification message sequence store 1697A and notification agent 1697) of one or more pre-determined sets of notification sequence information, each set defining at least a portion of the information required to generate a UI notification message sequence; the local storage of notification sequence information is organized so that a specific desired set of notification sequence information is determined by a notification trigger index or notification trigger message; the notification agent receives the notification trigger index or notification trigger

message from a notification trigger detection element; and the notification agent creates a complete notification message sequence by performing one or more of the following operations:

- a. initiate (e.g., generate, assemble, execute, or manage), a device notification message sequence by using the notification trigger index to look up a pre-stored set of message sequence information (e.g., after adding additional information or additional formatting, such as adding a UI background bitmap that is common to multiple notification message sequences);
- b. initiate a device notification message sequence by using the notification trigger message to look up a pre-stored set of message sequence information (e.g., notification information, UI bitmap, and/or UI formatting) and combining the pre-stored information with information included in the notification trigger message (e.g., usage count update, service plan usage condition or status, and/or specific service usage activity information) to form a complete notification message sequence;
- c. initiate a device notification message sequence by using the notification trigger index or trigger message information as a reference to initiate a notification message sequence based on information stored on a network element (e.g., pull down a particular set of message sequence information from a server or initiate/redirect a user to a particular portal or website message sequence, such as a series of web pages with options); or
- d. perform a combination of two or more of the above operations; and the device notification agent communicates with a device UI to provide the notification message sequence to the device user.

[00196] To further simplify the task of programming user notifications for DAS as described herein, it is advantageous for a network administrator to be able to simultaneously configure the network service usage notification policies in coordination with the device service usage notification policies. Accordingly, in some embodiments, a policy management & UI 132 element is included to provide a network administrator with a UI to simultaneously define higher level definitions and coordinated policy distribution through network element configuration and the device notification agent configuration, with the network and device configuration

capabilities including one or more of the following network configurations: higher level definition of trigger event detection criteria, association of trigger event detection criteria with trigger index or trigger message, higher level definition of trigger message content; and various device notification agent configurations (e.g., higher level definition of notification message sequence information, trigger event detection criteria programming in monitor, association of trigger event detection criteria with trigger index or trigger message). In some embodiments, the policy management & UI 132 provides a mechanism for a network administrator to simultaneously define the notification triggers as higher level service usage conditions, and to define the association between the notification trigger event detection criteria and the intended corresponding notification trigger index or notification trigger message and the corresponding notification message sequence on the device through a series of related UI screens that organize all of this required provisioning information into a convenient collection of related GUI information display and administrator input interfaces.

[00197] In some embodiments, the step of using the policy management & UI 132 to pre-configure the device notification agent 1697 to maintain a local device storage of one or more pre-determined sets of notification sequence information includes one or more of the following listed below.

- a. Policy management & UI 132 can provision (e.g., program, pre-configure, or download instructions to) the device notification agent with ordered text and/or graphics image information required in the notification message sequence and associate the information with a notification trigger index or notification trigger message, in which the information is configured and formatted such that a device service notification agent can access the information from device storage or in the notification agent software to initiate (e.g., generate, execute, assemble, or manage) and display a notification message sequence to the device UI.
- b. Policy management & UI 132 can provision the device notification agent to execute the ordered steps required to display the notification sequence that include accessing network based information display information or display sequences specified in the notification message sequence steps,

and associate the network based notification message sequence information with a notification trigger index or notification trigger message, in which the information is configured and formatted such that a device service notification agent can access the information from the network sources to initiate and display a notification message sequence to the device UI. For example, one or more of the notification message sequence steps can include: initiate a UI sequence that has information downloaded from a network based UI display file or sequence of files stored on a server, initiate a network based portal page or web view page or sequence of pages, or initiate a network based web site page or sequence of pages.

- c. Policy management & UI 132 can provision the notification index message triggered by the notification trigger detection element to include ordered text and/or graphics image information required in the notification message sequence, and can provision the device notification agent to incorporate the notification message sequence information included in the notification trigger index message, along with (i) other information stored locally on the device (e.g., message window graphics, UI interface formatting, other text and/or graphics information), and/or (ii) network based information display information or display sequences, into the ordered notification message sequence initiated by the notification agent for display of the notification message sequence to the device UI.
- d. The notification sequence information downloaded from the policy management & UI 132 can include any combination of steps a, b and c listed above.
- e. Policy management & UI 132 can update or download the notification agent software to specify a new notification message sequence that can be any combination of steps a, b and c listed above.

[00198] In some embodiments, user notifications for DAS includes providing a network management system for managing programmable network service usage notification policies and

enforcement; in which the notification policies define the service usage notification trigger event detection criteria and the associated messages that are intended to be displayed to a user of a device connected to the network; in which the network management system includes a notification policy administrator user interface and a notification policy management communication interface, and the notification policy management communication interface communicates provisioning or programming information to one or more network elements and/or one or more device elements that play a role in enforcement of notification policies; and the network management system performs the following operations to facilitate display of a user service usage notification message sequence to a user of the device connected to the network: enter service usage notification message sequence information; associate the notification message sequence information with a service usage notification trigger event detection criteria, in which the service usage notification trigger event detection criteria defines the service usage conditions or state of service usage for which the service usage notification message sequence is intended to be displayed to a device user; associate the service usage notification trigger event detection criteria with a notification trigger index or notification trigger message; program a notification trigger event detection criteria identification element, that inspects the service usage of the device, to detect the service usage notification trigger event detection criteria and send the notification trigger index or notification trigger message to a service usage notification agent; program a service usage notification agent to perform various operations. In some embodiments, programming a service usage notification agent to perform various operations, includes one or more of the following operations: store the service usage notification message sequence information; associate the notification trigger index or notification trigger message with the service usage notification sequence information; receive the notification trigger index or notification trigger message from the notification trigger event detection criteria identification element; upon receipt of the notification trigger index or notification trigger message from the notification trigger event detection criteria identification element; initiate the device user service notification message sequence based on the stored notification message sequence information and the information included in the notification trigger index or notification trigger message.

[00199] In some embodiments, programming the notification agent information store includes either updating the notification message sequence information or updating the entire notification agent application (e.g., replacing that agent with a newly updated/updated version of

that agent). In some embodiments, similarly update techniques can similarly be applied to various other elements described herein, such as the notification trigger event detection criteria, trigger index, trigger message, and so forth, as will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein.

[00200] In some embodiments, monitored service usage provided by the service Usage Monitor 140 function is classified into various service usage classifications or categories using various techniques as described herein (e.g., such categories can include browsing, email, music streaming, social networking, video streaming, news, shopping, and/or various other service usage or application categories). In some embodiments, service usage is classified by application, usage by destination, usage by time of day or network busy state (e.g., congestion), usage by roaming versus home network, and/or various other categories. In some embodiments, user notifications for DAS includes displaying the classified service usage categories to a user as part of service usage notification sequence that is triggered by user off of option button from a service usage notification message sequence triggered by a service usage trigger event detection criteria or off of the dashboard application.

[00201] In some embodiments, user notifications for DAS includes providing a device notification agent; in which the device maintains a service usage record that is classified into various service usage categories, in which a service usage category is based on a service activity type or an individual service activity; and the device also maintains a record of the service plan usage policies; a notification agent analyzes one or more service activity categories to determine the amount of a service usage allowance or service plan usage charge that is consumed by a category, in which the allowance is determined by one or more aspects of the overall service plan policies; and the amount of service plan allowance or usage charge that is due to the category is displayed to a device UI.

[00202] **Figure 4B** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments that includes a customer self help server and UI. Figure 4B includes the Customer Self Help Server and UI 134 and both network and device locations for the Trigger Event Detect 138 (e.g., Trigger Detect 138) and Usage Monitor 140 as shown. In some embodiments, the Customer Self

Help Server and UI 134 can upload self help information as shown and as described herein with respect to various embodiments.

[00203] **Figure 4C** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments that includes a customer self help server and UI. Figure 4C includes the Customer Self Help Server and UI 134 and network locations for the Trigger Event Detect 138 (Trigger Detect 138) and Usage Monitor 140 as shown. In some embodiments, the Customer Self Help Server and UI 134 can upload self help information as shown and as described herein with respect to various embodiments.

[00204] **Figure 4D** is a functional diagram illustrating another network architecture for user notifications for device assisted services (DAS) in accordance with some embodiments that includes a customer self help server and UI. Figure 4D includes the Customer Self Help Server and UI 134 and device locations for the Trigger Event Detect 138 (Trigger Detect 138) and Usage Monitor 140 as shown. In some embodiments, the Customer Self Help Server and UI 134 can upload self help information as shown and as described herein with respect to various embodiments.

[00205] **Figure 5** is a functional diagram for a user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a user interface (UI), such as for mobile station 100, includes a usage icon 510 on an application/utility portion of a primary or default UI screen 500, and also includes a usage gauge 520 (e.g., also referred to herein as a fuel gauge, as similarly described above) in a status bar of the primary or default UI screen 500 (e.g., the status bar can appear on other UI screens in addition to the primary or default UI screen 500, such as a secondary screen that includes icons for additional folders, utilities, and/or applications installed/available on mobile station 100). In some embodiments, the fuel gauge 520 provides an indication of the data remaining for an associated service plan (e.g., the subscriber's data plan). For example, the fuel gauge can include a display of the data remaining for an associated service plan similar to a fuel tank showing currently available fuel in a fuel tank (e.g., a gauge can indicate that it is half full to notify the user that half of the data remaining for an associated service plan is available based on a current service

usage measure and the associated service plan data limit for a given period, such as remaining in the current month). In some embodiments, the fuel gauge 520 provides an indication of the data remaining for an associated service plan including a color coded indication of the data remaining based on current service usage and the associated service plan (e.g., cap on data usage, such as based on bulk service usage and/or specific or itemized service usage by type of service). For example, a green colored fuel gauge 520 can indicate 50% to 100% of data remaining under the associated service plan, a yellow colored fuel gauge 520 can indicate 25% to 50% of data remaining under the associated service plan, an orange colored fuel gauge 520 can indicate 5% to 25% of data remaining under the associated service plan, and a red colored fuel gauge 520 can indicate 0% to 5% of data remaining under the associated service plan. As another example, a green colored fuel gauge 520 can indicate 50% to 100% of data remaining under the associated service plan, a yellow colored fuel gauge 520 can indicate 10% to 50% of data remaining under the associated service plan, and a red colored fuel gauge 520 can indicate 0% to 10% of data remaining under the associated service plan. As will now be apparent to one of ordinary skill in the art, various other color or other schemes can be used to provide status user indications based on service usage as described herein.

[00206] In some embodiments, usage icon 510 provides a real-time and accurate service usage implemented using various techniques as described herein (e.g., device based, network based, and/or hybrid based service usage count techniques). In some embodiments, usage icon 510 is an icon for an operating system function or utility/function bundled or integrated with the operating system (e.g., the operating system installed/preloaded or installed on mobile station 100). In some embodiments, usage icon 510 is an icon for a standalone usage application (e.g., an application that executes on an operating system of mobile station 100, such as an Android operating system, an Apple iPhone operating system, a Microsoft mobile operating system, an HP/Palm operating system, a Blackberry operating system, a Symbian operating system, and/or any other operating system or platform) that provides subscriber real-time data usage information for mobile station 100 and/or for an associated shared account as described herein. In some embodiments, the usage application or utility/function is pre-installed/pre-loaded on mobile station 100. In some embodiments, the usage application or utility/function is downloaded (e.g., pushed from a service provider/OEM or another entity and/or pulled by a user, such as via an application market place or application store for purchasing and downloading applications) and

installed on mobile station 100 after mobile station 100 has been provisioned and/or is installed at a retail distribution of the service provider pursuant to an initial provisioning and setup of mobile station 100 for a user of mobile station 100 (e.g., for a particular service provider network and associated service plan). In some embodiments, the usage application or utility/function is stored and/or executed in a secure partition (e.g., system partition of the operating system and/or a secure hardware partition of the CPU and/or memory and/or storage of mobile station 100). For example, the usage application can be installed in the system partition to prevent a user from uninstalling the usage application and/or otherwise disabling or compromising the usage application. In some embodiments, updates can be automatically provided to update the usage application or utility/function (e.g., using application updates delivered through an application market place/store to deliver enhancements, software/other fixes, and/or upgrade the usage application to support new operating system updates/versions).

[00207] **Figure 6** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, a UI for user notifications for DAS also includes an alert message 630 displayed on the status bar as shown. In some embodiments, if there is a usage alert (e.g., based on a service usage measure and the associated service plan and/or user configured usage alert thresholds/events and/or preferences), usage alert message 630 is displayed in the status bar along with the fuel gauge icon 620. In some embodiments, alert percentages and usage alert messages can be customized via a preferences menu as described herein with respect to various embodiments.

[00208] **Figure 7** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, a UI screen for user notifications for DAS includes ongoing notifications and alerts. In some embodiments, an ongoing notification and alert screen 700 is presented on a UI screen (e.g., of mobile station 100) as shown. In some embodiments, ongoing notification and alerts screen 700 is presented when a user expands (e.g., clicks or touches or otherwise activates or selects) the status bar usage notification/alert 630 and/or fuel gauge icon 520. In some embodiments, if the user expands the status bar, ongoing notification and alert screen 700 is presented, and ongoing notification and alert screen 700 displays Ongoing usage notifications 710 including how much data/service usage is remaining in the plan or a percentage of

data/service usage remaining in the plan (e.g., based on a current service usage measure and associated service plan service usage limit). As shown, ongoing usage notifications 710 indicates that 90% of data usage is remaining. In some embodiments, usage notifications that provide an indication of the data remaining for an associated service plan are also indicated with a color coded indication of the data remaining based on current service usage and the associated service plan as described above (e.g., usage gauge(s) and the alert message icon(s) can be color coded based on data remaining and/or other usage parameters and/or user preferences). In some embodiments, selecting the Clear button removes the displayed/pending notifications, but not the associated information (e.g., the current service usage measure is not cleared).

[00209] **Figure 8** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, ongoing notification and alert screen 800 also displays notifications 820 including any current usage related alerts (e.g., usage related alert messages and/or notifications as described herein). As shown, notifications 820 displays a data usage 45% remaining alert message. As also shown, Ongoing usage notifications 710 displays a current data usage 45% remaining notification. In some embodiments, usage notifications that provide an indication of the data remaining for an associated service plan are also indicated with a color coded indication of the data remaining based on current service usage and the associated service plan as described above (e.g., usage gauge(s) and the alert message icon(s) can be color coded with different colors based on data remaining and/or other usage parameters and/or user preferences, such as the ongoing data usage 45% remaining gauge can be color coded yellow and the data usage 45% data remaining notification icon can be color coded red). Various other alerts and/or user notifications can be displayed in accordance with various embodiments described herein.

[00210] **Figure 9** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, ongoing notification and alert screen 900 also displays notifications 820 including any current usage related alerts (e.g., usage related alert messages and/or notifications as described herein). As shown, notifications 7020 displays a data usage 5% remaining alert message. As also shown, Ongoing usage notifications 710 displays a current data usage 45% remaining notification. In some embodiments, selecting the ongoing message 710 and/or the notification message 7020 launches/displays the usage application and/or usage utility/function

as described herein with respect to various embodiments. Various other alerts and/or user notifications can be displayed in accordance with various embodiments described herein.

[00211] **Figure 10** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a user interface (UI), such as for mobile station 100, includes a usage icon 1010 on an application/utility portion of a primary or default UI screen 1000, and also includes a usage gauge 620 (e.g., also referred to herein as a fuel gauge, as similarly described above) in a status bar of the primary or default UI screen 1000 (e.g., the status bar can appear on other UI screens in addition to the primary or default UI screen 1000, such as a secondary screen that includes icons for additional folders, utilities, and/or applications installed/available on device 100). In some embodiments, usage icon 1010 represents a home screen widget that displays a fuel gauge with various associated service plan information, current data usage in percentage, and the current end cycle date for the associated service plan. In some embodiments, fuel gauge 620 is color coded based the data remaining in the associated service plan (e.g., green indicates 100%-50% remaining, yellow indicates 49%-10% remaining, and red indicates 9%-0% remaining). In some embodiments, if the usage icon or widget 1010 is selected (e.g., tapped/touched or clicked or otherwise selected), the usage application and/or usage utility/function is launched/displayed as described herein with respect to various embodiments.

[00212] **Figure 11** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a user interface (UI), such as for mobile station 100, includes a detailed usage gauge 1110 on an application/utility portion of a primary or default UI screen 1100 of a usage application and/or usage utility/function, and also includes a Data Remaining usage meter 1120 and a Plan “Average Daily” Usage meter 1130. In some embodiments, a usage application and/or usage utility/function includes a fuel gauge (e.g., fuel gauge 1110), service plan information (e.g., as shown on screen 900 and/or other or additional service plan information), a service usage/data usage percentage (e.g., Data Remaining usage meter 1120), and a velocity bar or velocity meter (e.g., Plan “Average Daily” Usage meter 1130). In some embodiments, the fuel gauge represents the amount of data left in the service plan. In some embodiments, the fuel gauge icon is color coded based on data remaining in the associated service plan as described herein (e.g., usage gauge icon 1120, detailed usage gauge 1110, data remaining usage meter 1120, and velocity

meter 1130 can be color coded with the same and/or different colors based on associated usage measures and/or configured settings/preferences). In some embodiments, the service plan information details the service plan capacity and the billing cycle end date, such as shown on UI screen 1100.

[00213] In some embodiments, velocity bar 1130 indicates current usages vs. average daily usage for the associated service plan and informs the user if he/she is using data at a faster or slower rate than the average daily rate (e.g., for a 50 MB monthly plan, the average daily rate is $50 \text{ MB}/30 \text{ days} = 1.6 \text{ MB/day}$). In some embodiments, the velocity bar 1130 includes a colored area that indicates a percentage of data remaining in the service plan and a small vertical bar that indicates expected average daily usage based on days into the billing cycle. For example, the colored area can be coded green if the user is using data slower than the average daily rate, yellow if the user is using data at or a little faster than the average daily rate, or red if the user is using data significantly faster than the average daily rate. As shown, UI screen 1100 displays that the user is using data at the associated service plan's "average daily" rate.

[00214] **Figure 12** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Figure 74 is similar to Figure 11 except that UI screen 1200 of Figure 12 indicates that the user has used less than half of the service plan data limit for the current cycle but that the user is using data at a rate that is faster/higher than the associated service plan's "average daily" rate (e.g., the velocity bar can be color coded to provide an alert, such as by color coding the velocity bar as red but color coding the data remaining usage meter and fuel gauge as green).

[00215] **Figure 13** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Figure 75 is similar to Figure 11 except that UI screen 1300 of Figure 13 indicates that the user has used more than half of the service plan data limit for the current cycle and that the user is using data at a rate that is faster/higher than the associated service plan's "average daily" rate (e.g., the velocity bar can be color coded to provide an alert, such as by color coding the velocity bar as red and color coding the data remaining usage meter and fuel gauge as yellow).

[00216] **Figure 14** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Figure 76

is similar to Figure 11 except that UI screen 1400 of Figure 14 indicates that the user has used more than 75% of the service plan data limit for the current cycle but that the user is using data at a rate that is slower/lower than the associated service plan's "average daily" rate (e.g., the velocity bar can be color coded to provide an alert, such as by color coding the velocity bar as green but color coding the data remaining usage meter and fuel gauge as red). For example, Figure 14 can be understood to notify the user that the user is running out of data and using at the plan "average daily" rate.

[00217] **Figure 15** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Figure 15 is similar to Figure 11 except that UI screen 1500 of Figure 15 indicates that the user has used more than 75% of the service plan data limit for the current cycle and that the user is using data at a rate that is faster/higher than the associated service plan's "average daily" rate (e.g., the velocity bar can be color coded to provide an alert, such as by color coding the velocity bar as red and color coding the data remaining usage meter and fuel gauge as red). For example, Figure 15 can be understood to notify the user that the user is running out of data and using data faster than the plan "average daily" rate.

[00218] **Figure 16** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a usage preferences screen 1600 is displayed (e.g., a usage preferences screen of a usage application or utility/function). In some embodiments, usage preferences screen 1600 is accessed via a menu preferences screen or other settings menu/preferences option(s) displayed/available on mobile station 100. In some embodiments, usage preferences screen 1600 includes option for configuring/setting preferences related to alerts and notifications (e.g., customize alert levels and notifications), plan information (e.g., view and configure associated service plan information), usage indicator(s) (e.g., set preferences for usage indicator(s), such as usage meters/gauges/bars), and/or update frequency(ies) (e.g., configure update frequency interval/period), as shown. In some embodiments, if a service plan is a shared service plan (e.g., family, corporate, or other shared service plan), the usage preferences are configured for the user and/or for the shared service plan's other users based on user's associated account configuration rights to configure such settings for other users on the share account (e.g., parents or an owner of a family plan can

have system admin rights to configure such settings to indicate what information users can see/access and/or configure).

[00219] **Figure 17** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an alert customization screen 1700 is displayed (e.g., accessed via a usage preferences screen 1600 of a usage application or utility/function). In some embodiments, alert customization screen 1700 includes options for configuring alerts based on data usage events/thresholds (e.g., to configure alerts based on when certain data usage thresholds are exceeded and/or specific alert messages associated with such threshold events). For example, an alert can be configured to notify the user that 50% of the associated service plan data limit for a given billing cycle has been used, and another can be configured to notify the user that more than 100% of the associated service plan data limit for a given billing cycle has been used and to inform the user that they can/should purchase more data. In some embodiments, alert customization screen 1700 allows a user to customize various alert percentages and associated messages that appear in a service menu. In some embodiments, alert customization screen 7900 allows a user to customize a subset of alert percentages and associated messages that appear in a service menu (e.g., certain alert messages can be required by the service plan and/or service provider, such as an indication that the user has exceeded the service plan capacity for the current billing cycle – the 100% alert). In some embodiments, alert customization screen 7900 allows a user to customize various default alert percentages and associated messages that appear in a service menu, such as alert percentage thresholds for 50%, 75%, 95% and 100% usage of service plan capacity, which can be changed by a user and/or service provider and/or owner of a shared account service plan. In some embodiments, default notification messages are associated with each service plan and set or configured by a service provider of each service plan. Various other alerts can be configured as described herein and as will now be apparent to one of ordinary skill in the art in view of the various embodiments described herein.

[00220] **Figure 18** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an alert customization screen 1800 is displayed (e.g., accessed via a usage preferences screen 1600 of a usage application or utility/function). In some embodiments, alert customization screen 1800 includes a dialog box 1810 to allow for user input for configuring alert preference settings (e.g.,

based on current data used of the associated service plan, such as 50% of the data limit has been used) and alert messages as shown. In some embodiments, alert percentages indicate percentage used and are customizable in increments of 1% (e.g., range is 1% to 99%). In some embodiments, notification messages are customizable and can be up to 50 characters each or set to some other maximum length. In some embodiments, more sophisticated alert configurations can be input using various user input screens, scripting, and/or programming techniques as would be apparent to one of ordinary skill in the art in view of the various embodiments described herein.

[00221] **Figure 19** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a plan information screen 1900 is displayed (e.g., accessed via a usage preferences screen 1600 of a usage application or utility/function). In some embodiments, plan information screen 1900 includes a cycle end date and a monthly allowance/associated service plan capacity or data limit per cycle/period (e.g., 50 MB of data per month) as shown. In some embodiments, plan information screen 1900 allows a user to view and configure service plan capacity (e.g., in MB) and billing cycle end date. In some embodiments, plan information screen 1900 includes various other associated service plan information (e.g., cost per cycle, upgrade options, service plan features and options, and/or other information).

[00222] **Figure 20** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a usage indicator preferences screen 2000 is displayed (e.g., accessed via a usage preferences screen 1600 of a usage application or utility/function), which allows a user to turn on and off usage indicator icon behavior and sounds. In some embodiments, usage indicator preferences screen 2000 includes various options/settings for configuring usage indicator preferences, such as whether the usage icon is always displayed in a source tray, whether sounds triggered with usage alerts, vibrating of the mobile station 100 (e.g., if supported) triggered with usage alerts, as shown. In some embodiments, usage indicator preferences screen 2000 includes various other options/settings.

[00223] **Figure 21** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an

alert/usage update frequency screen 2100 is displayed (e.g., accessed via a usage preferences screen 1600 of a usage application or utility/function). In some embodiments, alert/usage update frequency screen 2100 includes a option for configuring the time period for frequency updates for checking for current service usage (e.g., allows a user to change from a default usage update setting of 30 seconds to a range of 10-3600 seconds or some other frequency update range). In some embodiments, alert/usage update frequency screen 2100 includes a option for configuring the time period for frequency updates for checking for usage alerts (e.g., every 30 seconds).

[00224] **Figure 22** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, UI screen 2200 includes a data usage status display window 2210 (e.g., a data usage widget displayed on a home or default/primary UI screen of mobile station 100). In some embodiments, data usage status display window 2210 (e.g., for unlimited data plans and/or other service plans that can include various service usage limits and/or restrictions) displays current data usage in a widget format. In some embodiments, if data usage status display window 2210 is selected (e.g., touched, tapped, and/or otherwise selected), a usage application or utility/function is launched or displayed.

[00225] **Figure 23** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an unlimited plan usage screen 2300 is displayed (e.g., accessed via a usage application or utility/function and/or via data usage status display window 2210). In some embodiments, unlimited plan usage screen 2300 displays an amount of data (e.g., bytes, megabytes, and/or other data measure) sent, an amount of data received, a total amount of data usage, and an end cycle date.

[00226] **Figure 24** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an unlimited plan usage notification screen 2400 is displayed (e.g., showing a current data usage in the current cycle of 24 MB as shown). In some embodiments, notification screen 2400 includes various other usage notifications and/or alert messages (e.g., roaming usage notifications that are outside of the unlimited plan).

[00227] In some embodiments, user notifications for DAS provides for service plan initial purchase options, configuration options, change options, or service plan status without requiring the user to log into a portal or web page. In some embodiments, service plan information is embedded directly in locally stored user notification message sequence information. In some embodiments, a service plan selection (e.g., user interaction) platform is provided on a device that includes a native user notification agent, local service plan state information, and local service usage state information. In some embodiments, notification trigger event detection criteria that initiate a notification message sequence that provides the user with the option of modifying service policy configuration to better suit the service activities desired by the user that are indicated by the notification trigger event detection criteria is provided.

[00228] In some embodiments, user notifications for DAS includes facilitating a service plan selection using various techniques in accordance with various embodiments described herein. In some embodiments, user notifications for DAS includes one or more of the following: service configuration or selection options that are served during a user notification message sequence; service configuration or selection options that are served by branching out of a local user message sequence information stored locally on the device and served by, for example, a user notification agent and into a portal or website that is programmed as part of a user notification agent message sequence; service configuration or selection options that are locally served with a user notification agent and local message notification information store; service configuration or selection options that are served based on one or more notification trigger event detection criteria.

[00229] In some embodiments, user notifications for DAS that presents a service plan selection includes a notification trigger event detection criteria that occurs before a service plan limit is reached, and initiates a service plan selection option or configuration option notification message sequence. In some embodiments, user notifications for DAS that presents a service plan selection includes a notification trigger event detection criteria that identifies a service activity usage (e.g., one or more intended service activities) on the device that is not covered by a service plan (e.g., associated with the device, device group, and/or current/active user of the device), and initiates a service plan selection option or configuration option notification message sequence that provides one or more service plans (e.g., service plans or service plan options) that will allow the intended service activities to be served by the network. In some embodiments, user

notifications for DAS that presents a service plan selection further includes a notification message sequence that indicates that a network is not available with existing service connections and/or service plans but is available with a new service plan selection option. In some embodiments, user notifications for DAS that presents a service plan selection further includes a notification message sequence that indicates which service plans out of an available set of service plans are suited to the intended service activities.

[00230] In some embodiments, user notifications for DAS that presents a service plan selection further includes identifying trigger event detection criteria in which one or more intended service activities or one or more intended service activity patterns that caused a notification detection criteria to exist are not covered by a current available desired network access policy, service plan policy configuration or service plan policy; determining if one or more suitable service plan configurations or alternative service plans for a network are available; providing a notification message sequence (e.g., user notification message sequence) that offers options on the suitable service plan configurations or alternative service plans for a network are available. In some embodiments, user notifications for DAS that presents a service plan selection further includes a notification trigger event detection criteria that identifies intended service activity usage rate or usage patterns that fit the usage rate or usage patterns covered by one or more alternative service plan configurations or alternative service plans; and initiating a notification message sequence that informs a user of the availability of the alternative configuration or plan. In some embodiments, the notification trigger is implemented in the network (e.g., by one or more network elements) and/or on the device, as described herein with respect to various embodiments. In some embodiments, notification sequence information begins on the device and stays on the device (e.g., does not include or request any input from the network, that is, any network elements), as described herein with respect to various embodiments. In some embodiments, notification sequence information begins on the device and, at some point during the user notification messaging sequence process, branches to notification sequence information provided on a portal or website, as described herein with respect to various embodiments.

[00231] User support costs to provide users access to support center personnel via live telephone support at call centers can be quite expensive and can significantly lower profit margins for various application and/or service models. What is needed are improved techniques

for providing various types of self help to reduce such support costs. Accordingly, in some embodiments, user notifications for DAS includes facilitating self help (e.g., self help for users for using the device, network access, services, billing, service plans, and various other help related to network service usage and/or the wireless communication device) using various techniques in accordance with various embodiments described herein. In some embodiments, user notifications for DAS includes providing self help using various user notification for DAS techniques as described herein with respect to various embodiments. In some embodiments, user notifications for DAS includes providing self help that provides user with an analysis of service usage and offers alternative service plan policy configurations/options and/or alternative service plans. In some embodiments, user notifications for DAS includes providing self help to suggest various service plan configuration enhancements.

[00232] In some embodiments, user notifications for DAS includes providing self help to determine what service activities are consuming the largest amount of service usage. In some embodiments, user notifications for DAS includes providing self help to notify of service usage classification by category (e.g., display service usage by category). In some embodiments, classification categories include individual applications, groups of applications, destinations, groups of destinations, users, groups of users, devices, groups of devices. In some embodiments, a classification of service activities is included in a self help screen by application, groups of applications or categories of applications (e.g., email, browsing, social networking, and/or other application categories). In some embodiments, a hierarchical categorization is provided that includes a top level and a next level of the hierarchical categorization, or a top level that allows for a user to then, for example, click/touch or otherwise select down to a next level of the hierarchical categorization. In some embodiments, the classification of activities in the self help is based on individual network destinations, groups of destinations, and/or categories of destinations (e.g., and can similarly provide for a hierarchical categorization as described herein). In some embodiments, for each category, usage can be presented (e.g., listed). For example, for each category, usage can be listed and/or charges categorized by “within service plan” and “over service plan”. As another example, for each category, usage can be listed and/or charges classified by one or more of the following: the active network (e.g., 2G, 3G, 4G or WiFi), time of day (TOD) or network busy state (NBS) characterization, QoS characterization, and/or various other classifications as described herein with respect to various embodiments. In some

embodiments, the message sequence provides a user option to branch to a service plan selection page, service plan policy configuration page, service plan options page, and/or service plan descriptions page. In some embodiments, the message sequence provides an indication for plan configurations/options or alternative plans that may be better suited to one or more desired service activities or service activity patterns. In some embodiments, the category information is communicated to the network for storage on a network element (e.g., network storage system). In some embodiments, the category information is only communicated to the network for storage on a network element if the user opts in to allow for such category information to be communicated to the network for storage on a network element. In some embodiments, the category information is only communicated to the network for storage on a network element if the user acknowledges a request during a help transmission or help session.

[00233] In some embodiments, self help is provided to determine if the device is properly connected to the network. In some embodiments, self help is provided to indicate a type of network for classification categories. In some embodiments, self help is provided to indicate QoS usage of classification categories. In some embodiments, self help is provided to determine if an alternative service plan or alternative network (e.g., 2G, 3G, 4G or WiFi) is better suited for service usage activities desired by user.

[00234] In some embodiments, device stored notification sequence information can include notification branches and/or view objects that allow users to immediately view service plan status or make changes to service plan status (e.g., without delay that can be caused by network latency if such information must be requested and received from a network element via wireless network communication). In some embodiments, user notifications for DAS that provides self help includes detecting notification trigger event detection criteria on the device and suggesting changes in the service plan status, configuration, or choice based on the detected trigger, as similarly described herein with respect to various embodiments. In some embodiments, user notifications for DAS that provides self help includes a helper notification message sequence that is triggered based on notification trigger event detection criteria that assist the user in analyzing service plan usage, as similarly described herein with respect to various embodiments. In some embodiments, user notifications for DAS that provides self help includes a helper notification message sequence that is triggered based on notification trigger event detection criteria that assist the user in analyzing service plan usage, and suggesting possible

alternative plans that are better suited to the user's desired service usage patterns or activities (e.g., when user attempts activities that are not allowed; and/or user attempts activities that have high usage for the service plan that is selected; user attempts activities that have higher level QoS needs than what is available with the service plan selected, current NBS, current network performance, current network or on roaming network), as described herein with respect to various embodiments. In some embodiments, user notifications for DAS that provides self help includes a helper notification message sequence that is triggered based on notification trigger event detection criteria that assist the user in analyzing service plan usage, and suggesting an alternative service plan configuration, service plan, and/or network, as described herein with respect to various embodiments.

[00235] **Figure 25** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a usage dashboard 2500 displays a usage gauge, a usage meter, an indication of the current service plan (e.g., trial plan of 5MB and/or a Service Provider service plan), and an option to buy more data.

[00236] **Figure 26** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an Active Service screen 2600 various information associated with an active service for Free Trial Internet Access (e.g., sponsored service, and associated service information including service plan data usage cap/limit of 5MB, as shown).

[00237] **Figure 27** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Active Service screen 2700 includes various other information associated with another active service for Service Provider Web Access (e.g., sponsored service, and associated service information including service plan data usage cap/limit of 30MB, as shown).

[00238] **Figure 28** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a Service Offer selection screen 2800 includes options for a user to select a service plan offer. In some embodiments, the service offer selection screen 2800 allows a user to purchase and/or set up a mobile broadband access service plan for a laptop/computer, smart phone/PDA, a PC card (e.g., wireless modem or USB modem), and/or cell phone.

[00239] **Figure 29** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a Sponsored Services screen 2900 displays sponsored service offers as described herein with respect to various embodiments (e.g., a Google sponsored service for Google access and an Amazon sponsored service for Amazon shopping and/or Kindle access).

[00240] **Figure 30** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, an Individual Services screen 3000 displays options for selecting and/or purchasing various individual service offers (e.g., a NY Times service for NY Times online news access and a prepaid data plan). In some embodiments, a purchase confirmation screen, email, online receipt, mailed receipt, and/or other purchase confirmation response is presented or provided to the user upon confirmation and completion of a service purchase order.

[00241] **Figure 31** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a data usage patterns screen 3100 displays “Opt In” and “Opt Out” options for the monitoring and/or collection of certain detailed usage information (e.g., allowing users to opt in/out to allow various sponsored services or other services to collect detailed service usage information). /or alert messages (e.g., roaming usage notifications that are outside of the unlimited plan).

[00242] **Figure 32** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a usage dashboard 3200 displays a usage gauge, a usage meter, an indication of the current service plan (e.g., prepaid 50MB plan as shown), and an option to buy more data.

[00243] **Figure 33** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, a Service Usage Detail screen 3300 displays service usage by service including service name/type (e.g., email, system, instant messaging, and VOIP, as shown), data used for each service for a current cycle, and percentage of service plan capacity used for each service for a current cycle, and an option to buy more data option is also displayed. In some embodiments, Service Usage Detail screen 3300 is implemented as a widget (e.g., accessed/displayed on a primary screen/display of the communications device, such that when the user selects the widget, Service Usage Detail

screen 3300 is displayed. In some embodiments, Service Usage Detail screen 3300 includes a graph of data usage broken down by, for example, the top 5 or top 10 usage categories (e.g., applications, browsing, email, online video, online social networking, online music, and/or any other category of service usage).

[00244] **Figure 34** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, usage dashboard 3400 is displayed, and a data usage alert 3410 is also displayed notifying the user that the user has used half of their service plan allowance.

[00245] **Figure 35** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, usage dashboard 9400 is displayed, and another data usage alert 3510 is also displayed notifying the user that the user has used their daily free Google sponsored service allowance and that any additional Google service related data usage will come out of the associated service data plan. In some embodiments, service plan options and service plan monitoring is based on a time of day of service usage (e.g., plan is off peak, usage on peak; such as a service plan for off peak email and email text only on peak and/or a service plan that only allows for off peak downloads).

[00246] **Figure 36** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, usage dashboard 3600 is displayed, and an overage alert 3610 is also displayed notifying the user that the user has reached their service plan allowance/capacity and providing options for the user to either block the service usage or to allow the service usage (e.g., charges will be incurred).

[00247] **Figure 37** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, usage dashboard 3700 is displayed, and as usage block alert 3710 is also displayed notifying the user that a service plan needs to be selected to support the current/requested service usage activity and to click “OK” to review current service plan offers that would allow for/support the current/requested service usage activity.

[00248] **Figures 38A-B** are functional diagrams for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Figure 38A displays a service usage bar/meter (e.g., a master usage bar/meter) for a

shared account service plan that includes a current service usage for a Primary Line (e.g., primary user/device/line) of the shared account service plan, a current service usage for a line 2 (e.g., second user/device/line) associated with the shared account service plan, and a current service usage for a line 3 (e.g., third user/device/line) associated with the shared account service plan. As shown, Figure 38B shows another service usage bar/meter (e.g., an individual usage bar/meter) for the shared account service plan that only includes a current service usage for line 3 (e.g., third user/device/line) associated with the shared account service plan. In some embodiments, an owner or primary user (e.g., user associated with the primary line) of the shared account service plan can access/view the service usage bar/meter as shown in Figure 38A. In some embodiments, the third user (e.g., user associated with the third line) of the shared account service plan can only access/view the service usage bar/meter as shown in Figure 38B.

[00249] In some embodiments, if a member of the family plan is a child, then a parent owner of the family plan can set/configure their usage alerts. For example, alerts can be configured to be sent to the parent via user notification on the communications device associated with the parent, e-mail, SMS, voice message, and/or any other user notification. In some embodiments, the user notification to the parent can also allow the parent to perform usage alert related actions, such as to disable the child's service usage, continue with an overage, and/or update/select a new service plan. In some embodiments, the parent can allocate certain and/or all configuration of alerts to other members of the family plan. In some embodiments, the owner/point of contact of a corporate plan can have similar embodiments as described herein with respect to family plans and user notifications.

[00250] **Figure 39** is a functional diagram for another user interface for user notifications for device assisted services (DAS) in accordance with some embodiments. As shown, Figure 39 shows a service usage bar/meter (e.g., a master usage bar/meter) for a family plan that includes a current service usage for the family and for line 3 (e.g., third user/device/line) associated with the family plan.

[00251] **Figure 40** is a functional diagram for requesting user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, a charging agent is implemented using a network element/function (e.g., service controller 122, HA 6510, and/or another function/element). In some embodiments, the charging agent 4040

(e.g., an agent or function/element that monitors and/or reports data service usage, such as a service monitoring agent as described herein with respect to various embodiments) reports data/service usage updates to a reporting agent (e.g., UI Communication Agent 4030 or another agent or element/function that can be implemented in a network element/function, such as service controller 122, HA 6510, and/or another function/element, and/or implemented as a device element/function, such as service processor 115 another function/element of mobile station 100). As shown, charging agent 4040 reports data usage update information to UI Communication Agent 4030. When a user accesses a usage dashboard 4010, such as the usage dashboard described herein with respect to various embodiments, the usage dashboard 4010 access initiates a get data usage request to a Session Thread 4020. The Session Thread 4020 sends the get data usage request to the UI Communication Agent 4030, which responds with a current data usage update measure/count. The Session Thread 4020 reports the data usage update event to the usage dashboard 4010, which periodically requests and/or receives data usage updates as shown. In some embodiments, the charging agent 4040 is implemented on the device (e.g., service processor 115 of device 100, and the service/data usage update communications are secure local/inter-agent/process communications on the device, which can be periodically verified using various verification techniques as described herein). In some embodiments, data usage update events are periodically received and/or synchronized (e.g., pushed and/or pulled) based on network service usage measures as similarly described herein with respect to various embodiments. As will be apparent to one of ordinary skill in the art in view of the various embodiments described herein, various update and communication protocols can be implemented to provide current and accurate service/data usage measure information on the usage dashboard.

[00252] **Figure 41** is a functional diagram for a platform architecture for user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, a usage dashboard is implemented in user space 4105 (e.g., user space of an operating system, such as a framework layer of an Android operating system) and various policy enforcement and classification functions are implemented in a kernel space 4155 of an operating system of device 100. As shown, dashboard 4110 is implemented in user space 4105 along with a communication manager 4120, a UI communication agent 4130 (e.g., for implementing UI notifications as described herein with respect to various embodiments, such as user interface

120), a charging agent 4140 (e.g., a service monitoring/reporting agent as described herein with respect to various embodiments, such as service monitor agent 1696), and a policy decision agent 4150 (e.g., a policy control agent as described herein with respect to various embodiments, such as policy control agent 1692). As also shown, classifier 4160 (e.g., a service control monitoring and classification function as similarly described herein with respect to various embodiments) is implemented in kernel space 4155 along with a policy enforcer 4170. In some embodiments, communication manager 4120 is responsible for messaging between service processor 115 and service controller 122 (e.g., or equivalent network element, such as RTR).

[00253] In some embodiments, communication manager 4120 collaborates with a message bus component to send and receive model objects to policy decision agent 4150 and communication agent 4130. In some embodiments, policy decision agent 4150 is responsible for adapting service access policies (e.g., filters and/or actions) into access and classification rules. In some embodiments, policy decision agent 4150 is responsible for communicating adapted policies to classifier 4160 and policy enforcer 4170. In some embodiments, policy decision agent 4150 receives and persistent classification rules (e.g., earned rules) from the classifier 4160. In some embodiments, policy decision agent 4150 collaborates with the message bus to receive service access policies from communication manager 4120. In some embodiments, policy decision agent 4150 collaborates with the message bus to receive usage reports from charging agent 4140. In some embodiments, charging agent 4140 is responsible for receiving usage counting counts from policy enforcer 4170. In some embodiments, charging agent 4140 generates usage reports based on aggregation defined by the charging/service usage policy. In some embodiments, charging agent 4140 communicates usage reports to the message bus. In some embodiments, UI communication agent 4130 collaborates with the message bus for policy decision agent 4150 and charging agent 4140 messages. In some embodiments, UI communication agent 4130 is responsible for UI notification messaging between the service processor 115 and the dashboard application or utility/function 4110. In some embodiments, dashboard 4110 is a user application that displays usage notification information and/or alerts and/or messages, allows a user to select service(s), and assists in service usage measurement/monitoring. In some embodiments, dashboard 4110 collaborates with the service processor 115 via the message bus. In some embodiments, classifier 4160 maps data streams to access policy filters. In some embodiments, classifier 4160 is responsible for finding the

matching set of actions for a data/service usage stream. In some embodiments, policy enforcer 4170 enforces actions on the data/service stream. In some embodiments, the policy enforcement agent classifies the stream as background services (e.g., which, in some cases/per some service policies, can be blocked during peak hours and/or not allowed at all, such as when no bulk service plan has been activated), and if a classified background service is blocked, the policy decision agent informs the UI communication agent via the message bus to notify the user (e.g., not by sending an alert message, which can be considered annoying to the user, but rather using a dynamic icon, such as a glowing icon or toast, as when users select to see details can get the alert message, and in some cases, the device can continually glow the dynamic icon while detecting any disallowed background services as an example form of UI notification for certain types of alerts/events).

[00254] **Figure 42** is a functional diagram for another platform architecture for user notifications for device assisted services (DAS) in accordance with some embodiments. In some embodiments, a modem 4210 is in communication with a kernel layer 4240 of a platform of a device (e.g., mobile station 100), and the kernel 4240 includes a stack 4220 for network communication via modem 4210 and a policy enforcement 4230 for controlling network communication (e.g., access controls, such as allow, block, throttle, and/or other access controls, which can be based on various service policies received from a service cloud, such as from a service controller 122 in communication with a policy manager 4250). As also shown, policy manager 4250 is in communication with policy enforcement 4230, and resides in a framework layer 4270 of the platform. DAS client 4260 is in communication with policy manager 4250 and also resides in the framework layer 4270. In some embodiments, the platform is a Linux based platform, such as Android or another operating system or platform, and the framework layer 4270 generally is understood to reside in user space of the operating system platform and the kernel layer 4240 in the kernel space of the operating system platform. In some embodiments, DAS client 4260 implements various UI notifications for DAS techniques as described herein with respect to various embodiments. In some embodiments, DAS client 4260 implements various other DAS techniques as described herein with respect to various embodiments.

[00255] In some embodiments, a launch or execution of an application on the device is determined/detected using various techniques. For example, policy manager agent 4250 can subscribe as a listener to applicant start intent to listen to such application start events. The

policy manager agent 4250 can determine whether a policy exists/applies to a started application. If a policy exists and applies to the started application, then the policy manager agent 4250 can communicate the policy to policy enforcement agent 4230 to enforce that policy (e.g., allow, block, throttle, monitor and cap usage based on an associated data limit, or another service policy related enforcement action) with respect to service usage associated with that application (e.g., based on a package name/application name and/or a unique process ID associated with that application). In some embodiments, policy enforcement components are implemented in the kernel 4240 layer on, for example, a Linux platform or another operating system platform, as an extension to the operating system kernel (e.g., using a kernel patch for adding new kernel level interfaces and using proprietary code/modules/programs that call/exercise those kernel level interfaces (inbound and outbound interface) in which various necessary components get included with the kernel) for intercept and stack control for various policy enforcement functions as described herein with respect to various embodiments. In some embodiments, policy enforcement 4230 implements various policy enforcement functions (e.g., using net filter, tc, queue disc, and/or other traffic control functions) including, for example, traffic inspection for classification and/or traffic control implementation using various techniques as described herein with respect to various embodiments. For example, using these client based policy enforcement techniques, an application/new service usage that is not allowed under a current policy can be blocked and/or otherwise controlled without having to initiate and use OTA network communication bandwidth to reach a network based policy enforcement element/function (e.g., HA 6510 and/or another network element/function). In some embodiments, when an application is exited, an associated event indicating that the application is exited is intercepted as similarly described above with respect to application start events, and the event is passed to the policy enforcement agent 4230 to remove any associated policy for that application. In some embodiments, different policies apply to a given application based on an Access Point Name (APN) (e.g., 2G, 3G, 4G, WiFi, or other APNs). In some embodiments, a 5-tuple is used to provide classification (e.g., layer 4 and/or layer 7 classification) for filtering (e.g., the 5-tuple can include protocol type, source port, source IP, destination port, destination IP, in addition to an application/process ID).

[00256] In some embodiments, an alert classification is provided (e.g., based on activity; such as whether the monitored service usage activity is an application that the user is currently

interacting with or a hidden application that is running but not currently being interacted with by the user, such as a background synchronization, system service, or other activity/application/function in which case the UI notification can be provided in the form of a glowing icon or another form of a less intrusive UI notification mechanism). In some embodiments, DPI functions performed by network based monitoring perform granular service usage monitoring but cannot necessarily detect/determine service usage activity at the same level of granularity as can be provided by DAS based monitoring and classification (e.g., whether the monitored service usage activity is an application that the user is currently interacting with or a hidden application that is running but not currently being interacted with by the user and/or encrypted service usage). In some embodiments, UI notifications can be triggered for various reasons, such as there is no capable plan that allows for/permits a requested service usage, the requested service usage is blocked by current service policies, and/or a service plan limit has been reached or exceeded.

[00257] In some embodiments, policy manager detects events/alerts (e.g., usage events/alerts) and generates UI notifications (e.g., toasts, widget updates, dynamic icons, glowing icons, and/or other UI notifications). In some embodiments, alerts can be in message notifications referred to as toasts (e.g., a small window that appears in lower portion of screen for a specific period of time). In some embodiments, policy manager 4250 generates UI notification messages using a message bus that other agents/components listen to and display as applicable. In some embodiments, a status bar and status tray provides usage notification information, such as for a real-time or near real-time service usage indicator(s) as similarly described herein with respect to various embodiments. In some embodiments, a widget displays UI notification information, such as for real-time or near real-time service usage versus service plan in which the widget can be selected to launch a usage that can provide additional usage information and/or options as similarly described herein with respect to various embodiments.

[00258] In some embodiments, UI features and/or displays, such as UI notifications for DAS, are platform independent. In some embodiments, UI features and/or displays, such as UI notifications for DAS, are platform independent. For example, using a platform independent implementation, various usage notification displays (e.g., usage gauges/meters/bars) as described herein with respect to various embodiments, are common across platforms, that is, can be identically or similarly implemented across multiple platforms so that users can readily recognize

such UI notifications on various platforms as would be appreciated by one of ordinary skill in the art in view of the various embodiments described herein.

[00259] **Figure 43** is a flow diagram for user notifications for device assisted services (DAS) in accordance with some embodiments. At 4302, a process for user notifications for DAS begins. At 4304, service usage is monitored. At 4306, service usage is reported. In some embodiments, service usage monitoring is performed using network based techniques, device assisted techniques, and/or various combinations of network based and device assisted techniques as described herein with respect to various embodiments. At 4308, a service usage measure or count is updated. At 4310, the updated service usage count is reported (e.g., a network based service usage measure can be reported to the device, such as mobile station 100, and/or the network based service usage measure can be used to synchronize a local service usage measure, as described herein with respect to various embodiments). At 4312, whether a UI notification is triggered based on the updated service usage count is determined. If not, then process flow returns to 4304 and service usage is monitored. If a UI notification is triggered, then a UI notification is displayed at 4314 in accordance with various embodiments described herein.

[00260] Although the foregoing embodiments have been described in some detail for purposes of clarity of understanding, the invention is not limited to the details provided. There are many alternative ways of implementing the invention. The disclosed embodiments are illustrative and not restrictive.

[00261] WHAT IS CLAIMED IS:

CLAIMS

1. A system, comprising:
a processor of a communications device in wireless communication with a wireless network, wherein the communications device is configured to:
5 implement a native device notification agent;
 receive a plurality of intermediate network based service usage measures, wherein the plurality of intermediate network based service usage measures include a service usage measure that indicates that the service usage has not exceed a service plan limit;
 receive a plurality of device based service usage measures;
10 identify one or more notification trigger events using a notification trigger event filter, wherein the one or more trigger events are indexed; and
 generate a user notification using the device notification agent based on the one or more notification trigger events; and
 a memory of the communications device coupled to the processor and configured to
15 provide the processor with instructions.
2. The system of claim 1 wherein the plurality of device based service usage measures are periodically synchronized using the plurality of intermediate network based service usage measures.
3. The system of claim 1, wherein the notification trigger event filter is received from a
20 network element via the wireless network, and the notification trigger event filter includes a service usage activity pattern that is based on a plurality of service usage activities with aggregated service usage counts.
4. The system of claim 1, wherein the notification trigger event filter includes a service usage activity pattern that is based on a plurality of service usage activities with aggregated
25 service usage counts.
5. The system of claim 1, wherein the notification trigger event filter includes a service plan level usage event or pattern.
6. The system of claim 1, wherein the notification trigger event filter includes a policy state index.

7. The system of claim 1, wherein the notification trigger event filter includes a policy state index, and wherein the policy state index includes one or more of the following criteria: a network busy state level, a quality of service level, a time of day, an active network, a roaming network, and a service availability.
- 5 8. The system of claim 1, wherein the user notification includes a native user interface notification that includes a pre-stored usage notification.
9. The system of claim 1, wherein the user notification is selected from a set of pre-stored user interface notification objects or user interface notification object configurations.
- 10 10. The system of claim 1, wherein the user notification reports a service usage level selected from one or more of the following: a percentage of a service plan limit, a percentage over a service plan limit, an absolute level of service usage, a service usage amount remaining under a service plan limit, and a service usage amount over a service plan limit.
11. The system of claim 1, wherein the user notification reports a service usage rate or service usage velocity.
- 15 12. The system of claim 1, wherein the user notification includes a marketing interceptor, wherein the marketing intercept includes one or more alternative service plans or service plan options based on monitored service usage activities.
13. The system of claim 1, wherein the user notification is for a monitored service plan level event.
- 20 14. The system of claim 1, wherein the user notification is for a monitored service component level event.
15. The system of claim 1, wherein the user notification is for a monitored service activity level event.
- 25 16. The system of claim 1, wherein the user notification is for a monitored application event, wherein one or more applications are monitored and user notifications are generated based on monitored usage of the one or more applications.

17. The system of claim 1, wherein the user notification is for a monitored application event, wherein user notification includes a warning that use of the monitored application will cause a service plan overage.

18. The system of claim 1, wherein the user notification provides an indication that a requested application is not supported under a current service plan and an offer to present alternative service plans that support the requested application, and wherein an application startup interceptor blocks the requested application.

19. The system of claim 1, wherein the user notification provides an indication that a requested application is not supported under a current service plan and an offer to present allowing the requested application for a higher service usage fee, and wherein an application startup interceptor blocks the requested application based on a current network busy state.

20. The system of claim 1, wherein the user notification provides an indication that a requested application is not supported under a current service plan and an offer to present allowing the requested application for a higher service usage fee, and wherein an application startup interceptor blocks the requested application based on a current quality of service level.

21. The system of claim 1, wherein the user notification provides an indication that a requested application is being throttled under a current service plan and an offer to present allowing the requested application for a higher service usage fee.

22. A system, comprising:

a processor of a communications device in wireless communication with a wireless network, wherein the communications device is configured to:

implement a native device notification agent for generating user notifications for an application usage management service on the communications device;

monitor usage of one or more applications; and

generate a user notification, wherein the user notification includes an indication that usage of the one or more applications is likely to cause a service plan overage; and

a memory of the communications device coupled to the processor and configured to provide the processor with instructions.

23. The system of claim 22 wherein the communications device is further configured to:

receive an application filtering table from a network element via the wireless network, wherein the application filtering table identifies which of the one or more applications to monitor, intercept, and/or generate one or more user notifications based on the application, monitored application usage, and/or monitored service usage and/or other wireless network related criteria.

24. The system of claim 22 wherein the communications device is further configured to: store an application filtering table on the communications device, wherein the application filtering table identifies which of the one or more applications to monitor, intercept, and/or generate one or more user notifications based on the application, monitored application usage, and/or monitored service usage and/or other wireless network related criteria.

25. A system, comprising:
a processor of a network device in wireless communication with a plurality of communications devices via a wireless network, wherein the network device is configured to:
monitor usage of one or more applications on the plurality of communications devices;
determine which of the one or more applications are likely to cause service usage overages for one or more service plans; and
send a user notification message to one of the plurality of communications devices, wherein the user notification includes an indication that usage of the one or more applications is likely to cause a service plan overage; and
a memory of the network device coupled to the processor and configured to provide the processor with instructions.

26. The system of claim 25 wherein the network device is further configured to: send to one of the plurality of communications devices a list of the one or more applications determined to likely cause service usage overages for a service plan associated with the one of the plurality of communications devices.

27. The system of claim 25 wherein the network device is further configured to: send to one of the plurality of communications devices a list of the one or more applications determined to likely cause service usage overages for a service plan associated with

the one of the plurality of communications devices, wherein the list of the one or more applications is included in a user notification.

28. The system of claim 25 wherein the network device is further configured to:

5 send to one of the plurality of communications devices a list of the one or more applications determined to likely cause service usage overages for a service plan associated with the one of the plurality of communications devices, wherein the list of the one or more applications is included in a user notification that includes a user acknowledgement request.

29. The system of claim 25 wherein the network device is further configured to:

10 receive a service usage report from one of the plurality of communications devices;
 analyze the service usage report to determine whether to generate a user notification based on the service usage report; and

 send a user notification request message to the one of the plurality of communications devices based on the determination, wherein the one of the plurality of communications devices uses the user notification request message to identify a pre-stored user notification.

15 30. The system of claim 25 wherein the network device is further configured to:

 monitor a network based service usage for one of the plurality of communications devices; and

 send a user notification request message to the one of the plurality of communications devices based on the monitored network based service usage for the one of the plurality of
20 communications devices, wherein the one of the plurality of communications devices uses the user notification request message to identify a pre-stored user notification to notify the user.

USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES

ABSTRACT OF THE DISCLOSURE

[00262] Various embodiments are disclosed for user notifications for device assisted services (DAS). In some embodiments, user notifications for device assisted services includes a processor of a communications device configured to: implement a native device notification agent; receive a plurality of intermediate network based service usage measures, in which the plurality of intermediate network based service usage measures include a service usage measure that indicates that the service usage has not exceed a service plan limit; receive a plurality of device based service usage measures; identify one or more notification trigger events using a notification trigger event filter, in which the one or more trigger events are indexed; and generate a user notification using the device notification agent based on the one or more notification trigger events; and a memory of the communications device coupled to the processor and configured to provide the processor with instructions. In some embodiments, the user notification includes a fuel gauge and/or usage meter.

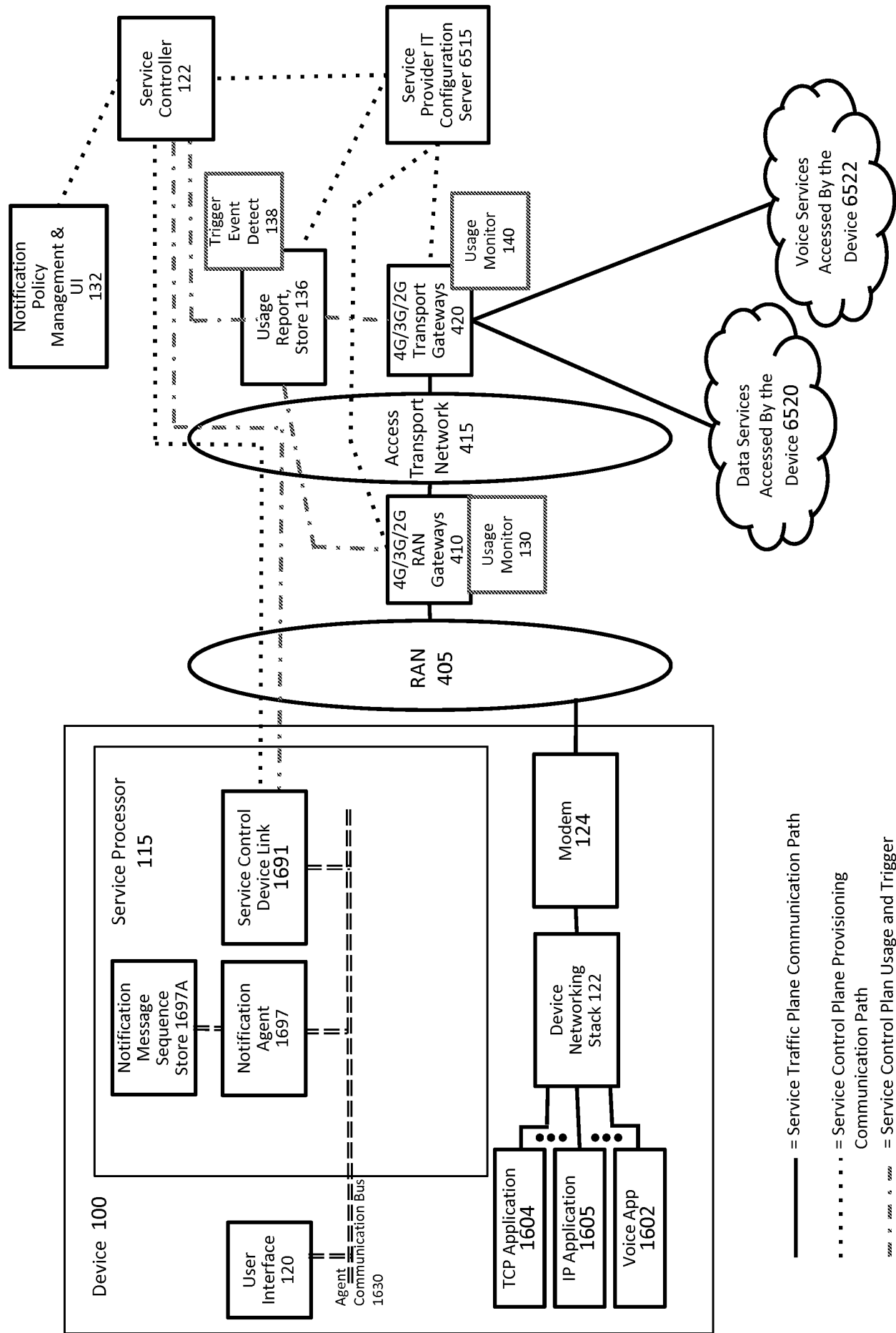


Figure 1

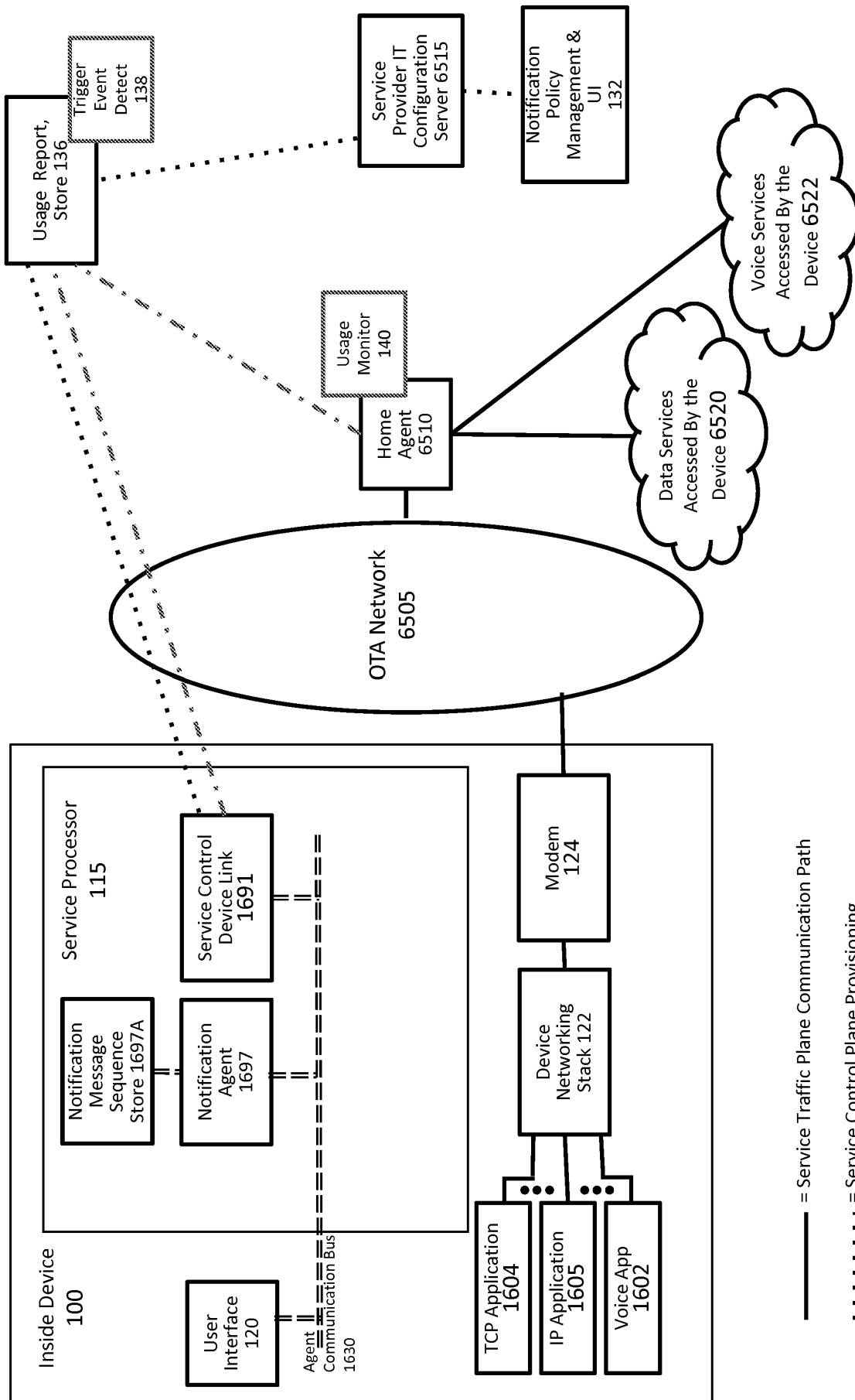


Figure 2A

— = Service Traffic Plane Communication Path
 = Service Control Plane Provisioning Communication Path
 - - - - - = Service Control Plane Usage and Trigger Information Communication Path

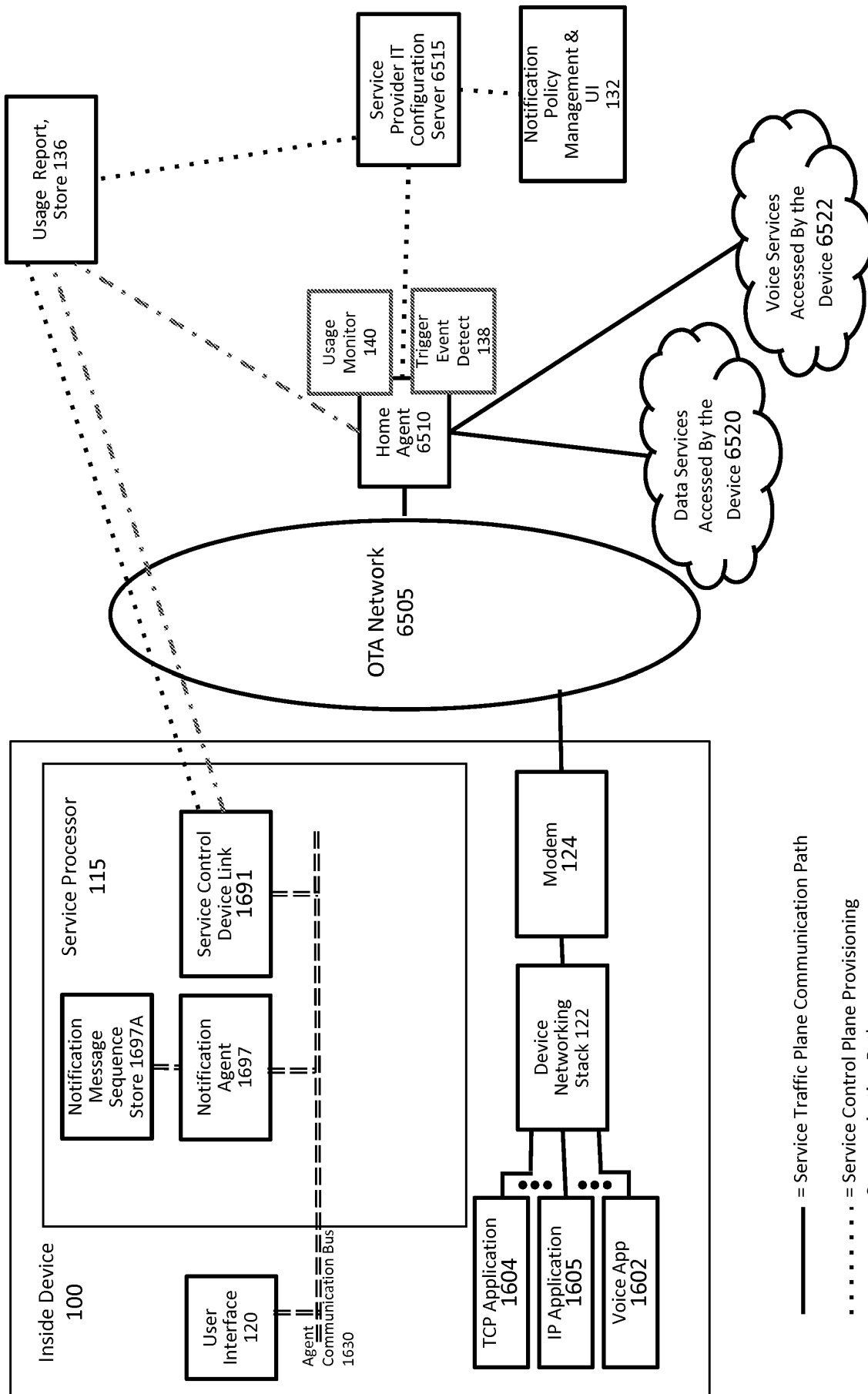


Figure 2B

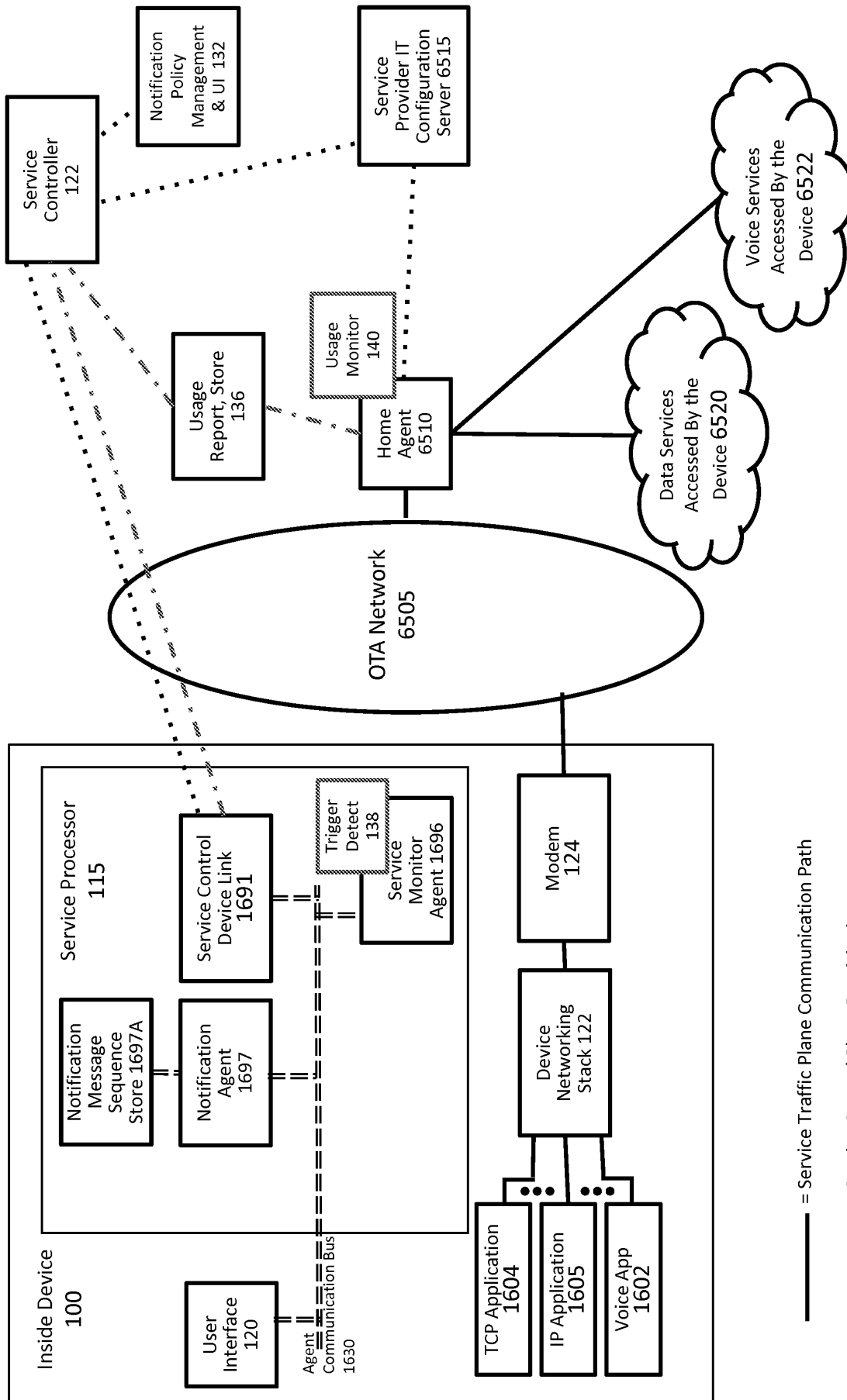


Figure 2C

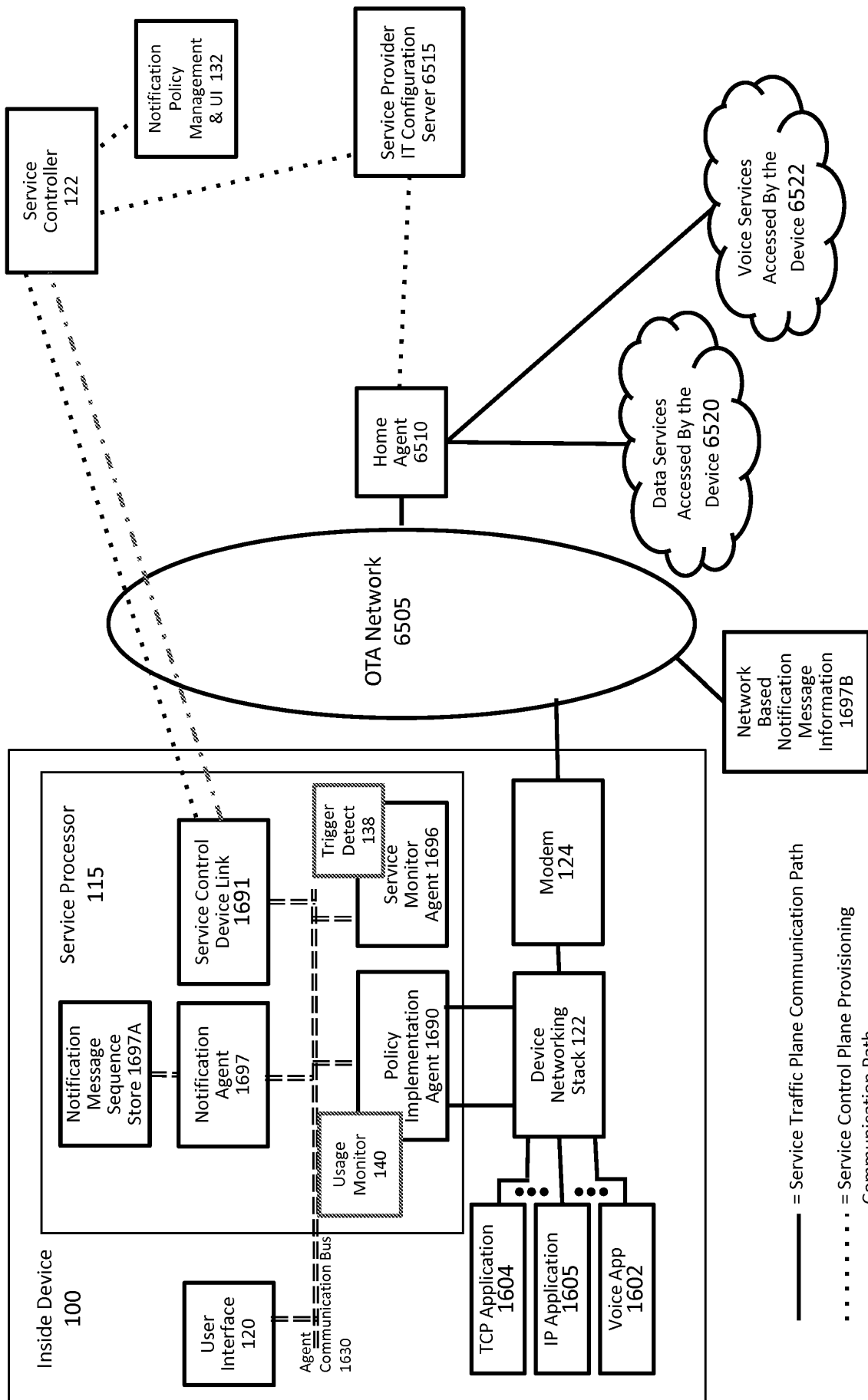


Figure 2D

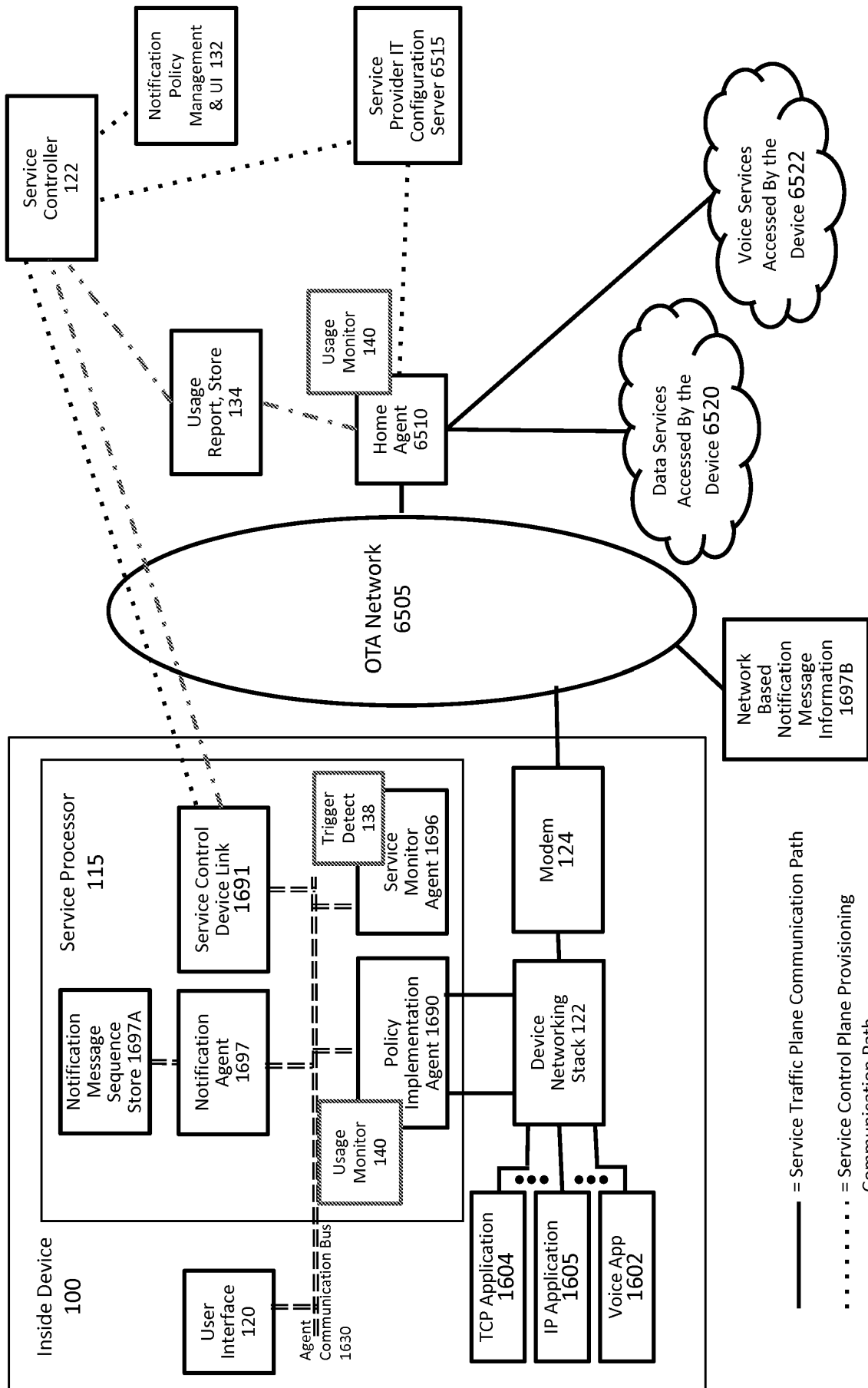


Figure 2E

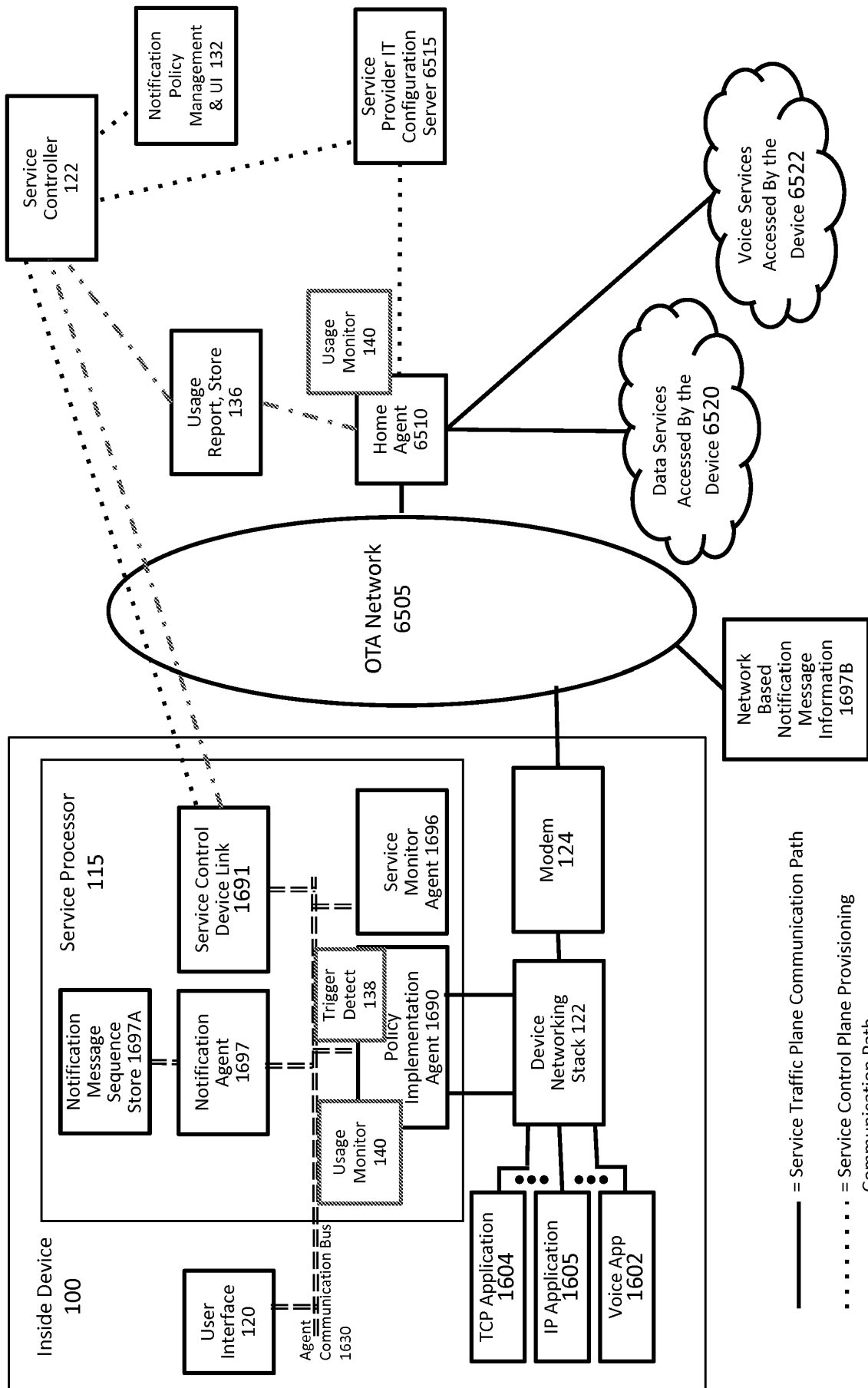


Figure 2F

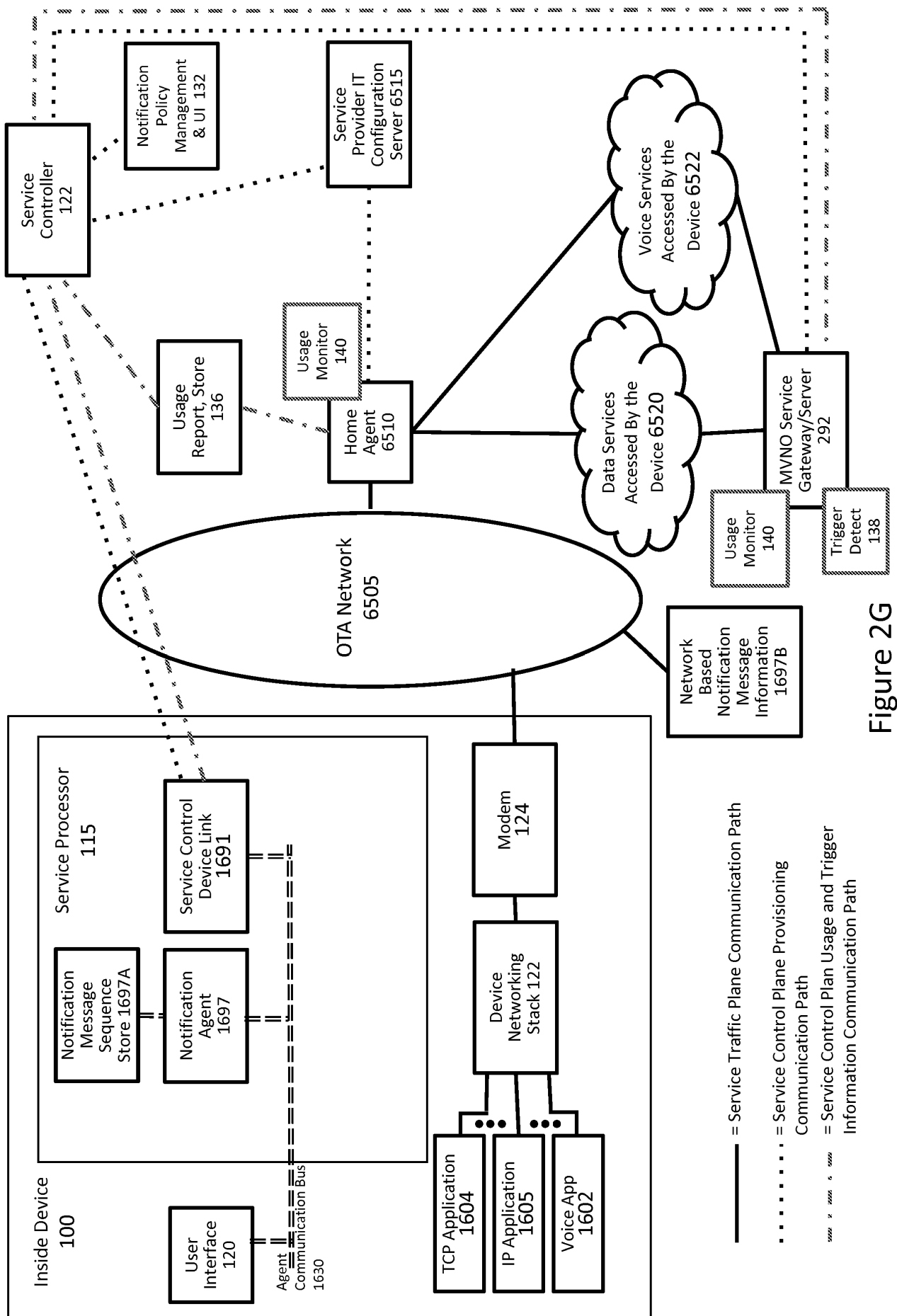


Figure 2G

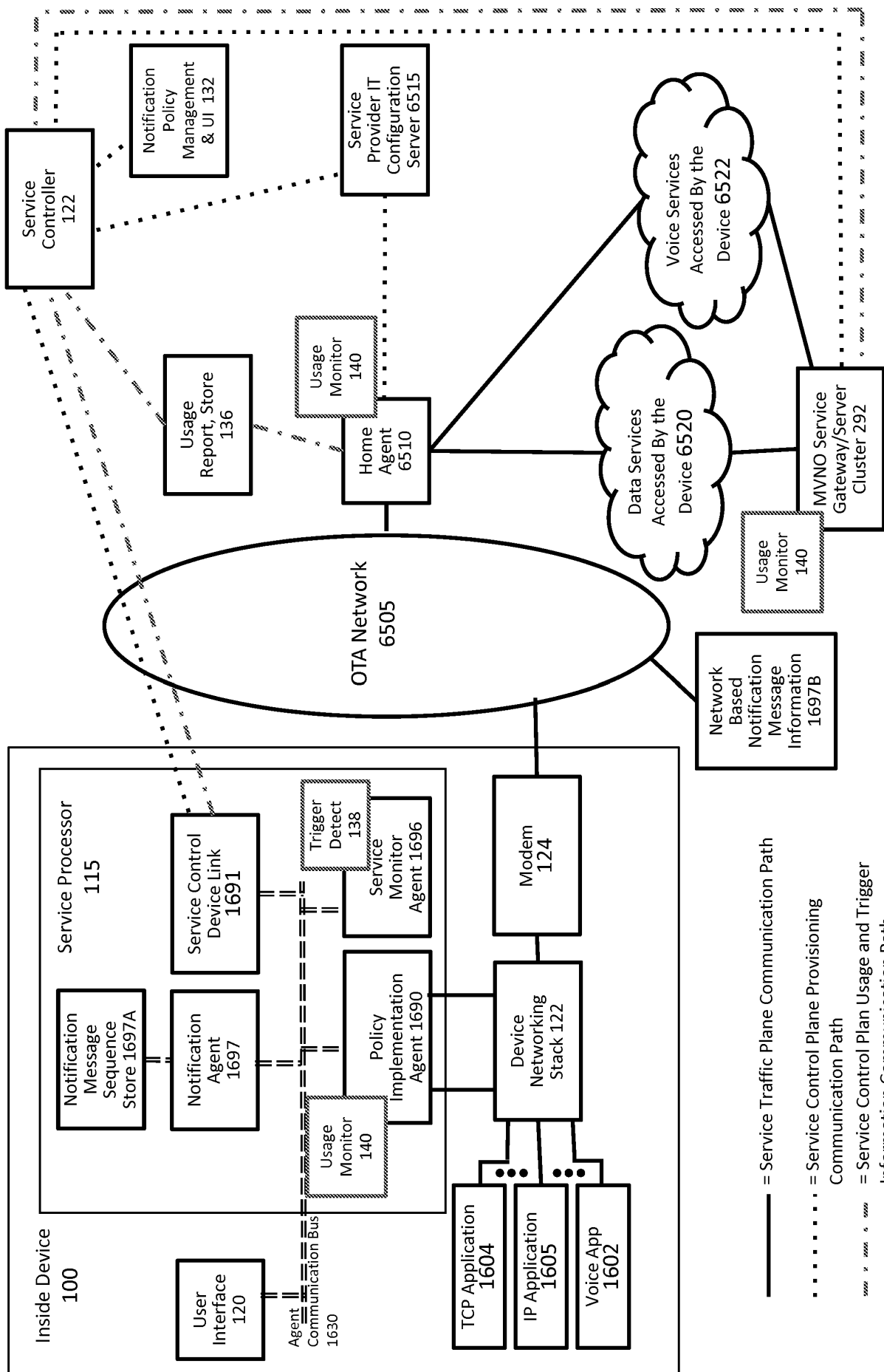


Figure 3

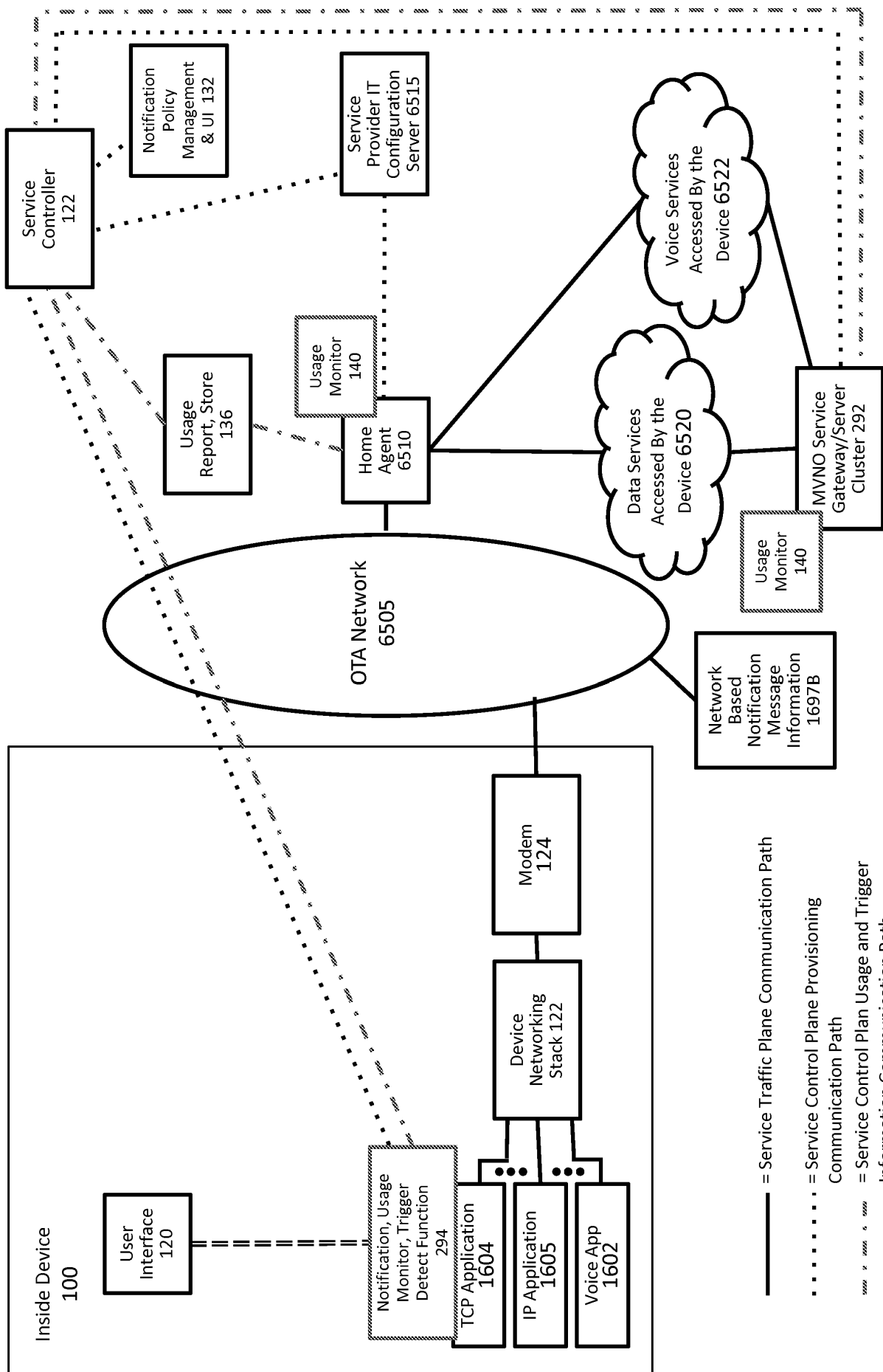


Figure 4A

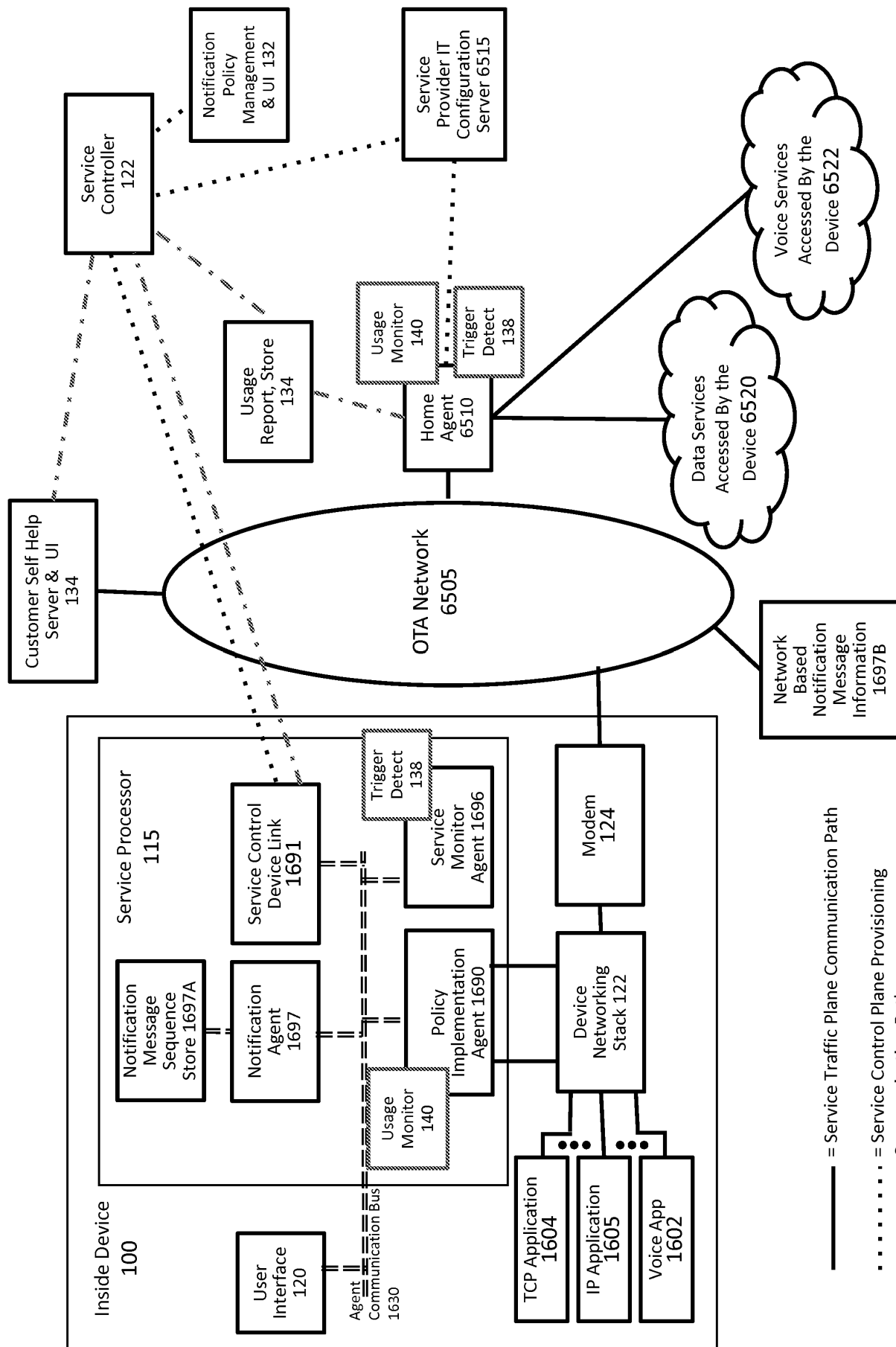
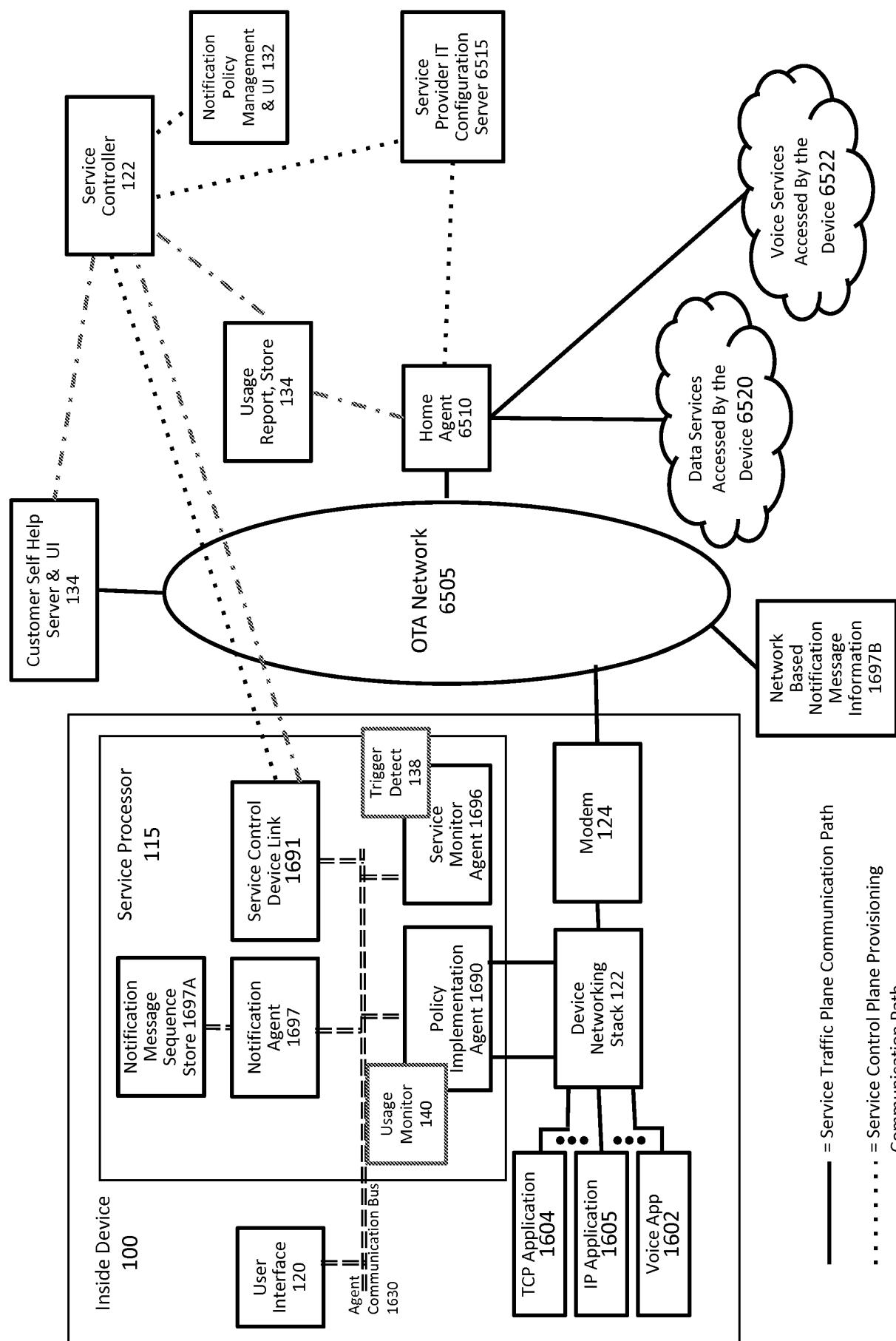


Figure 4B



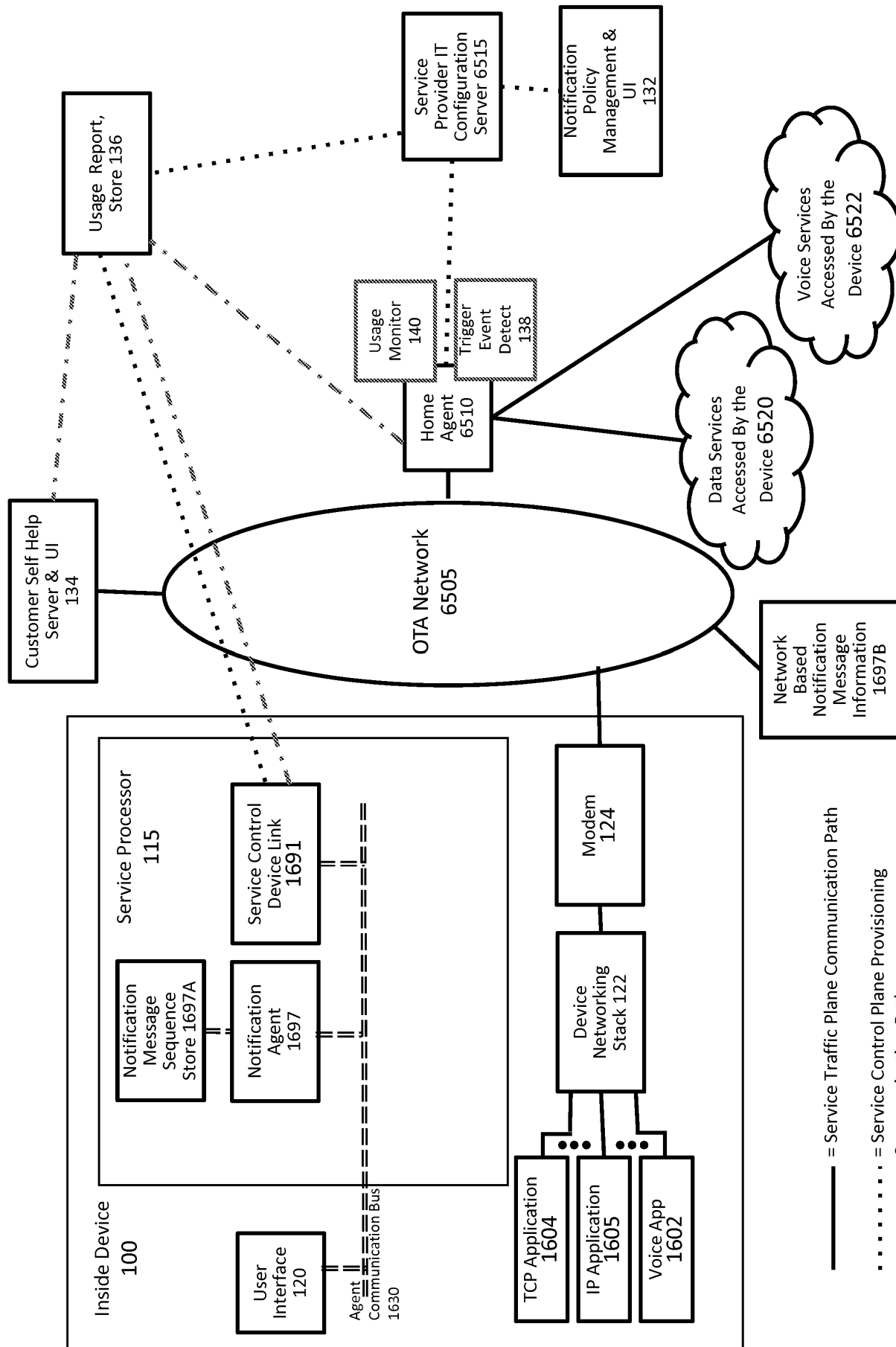


Figure 4D

500

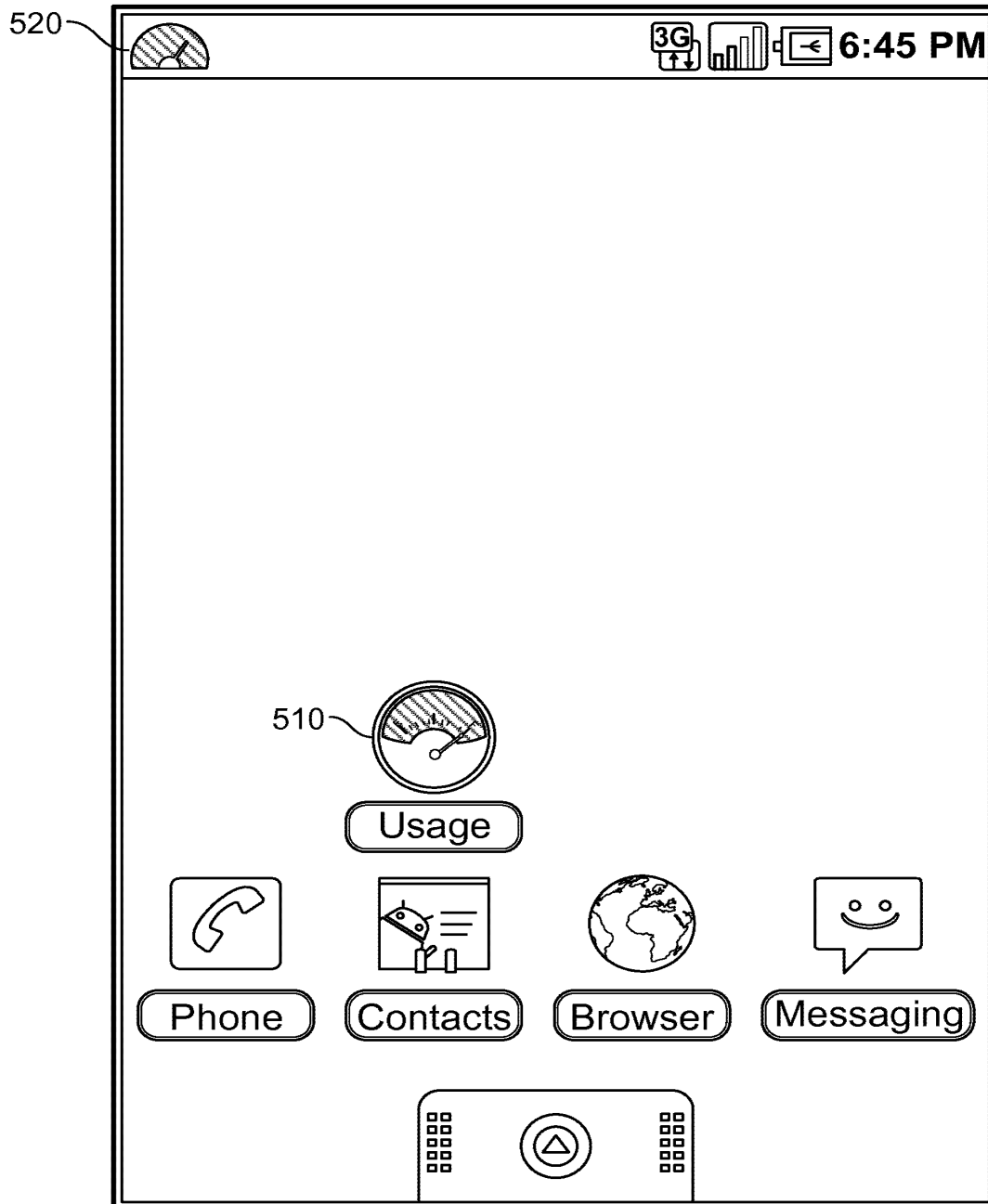


FIG. 5

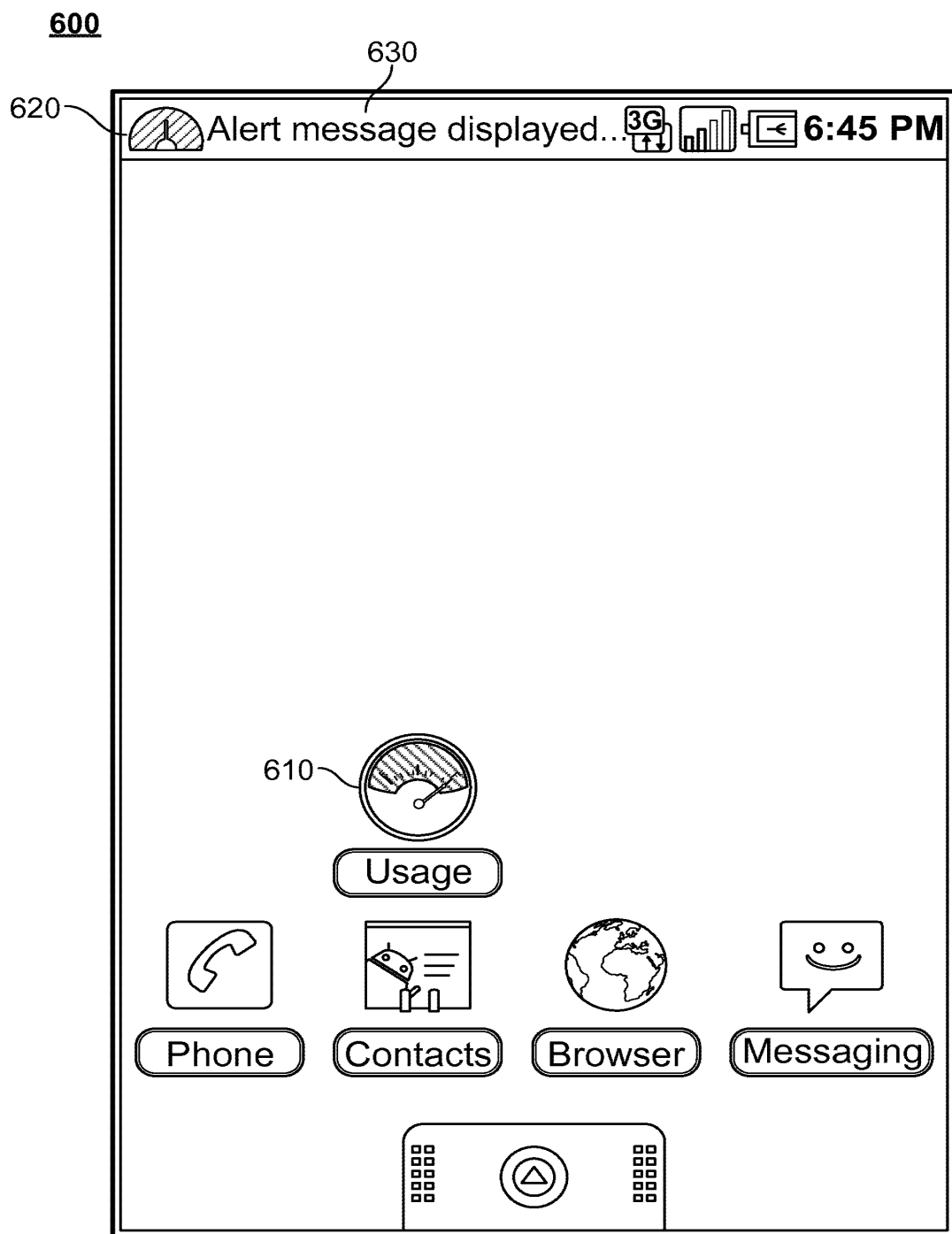


FIG. 6

700

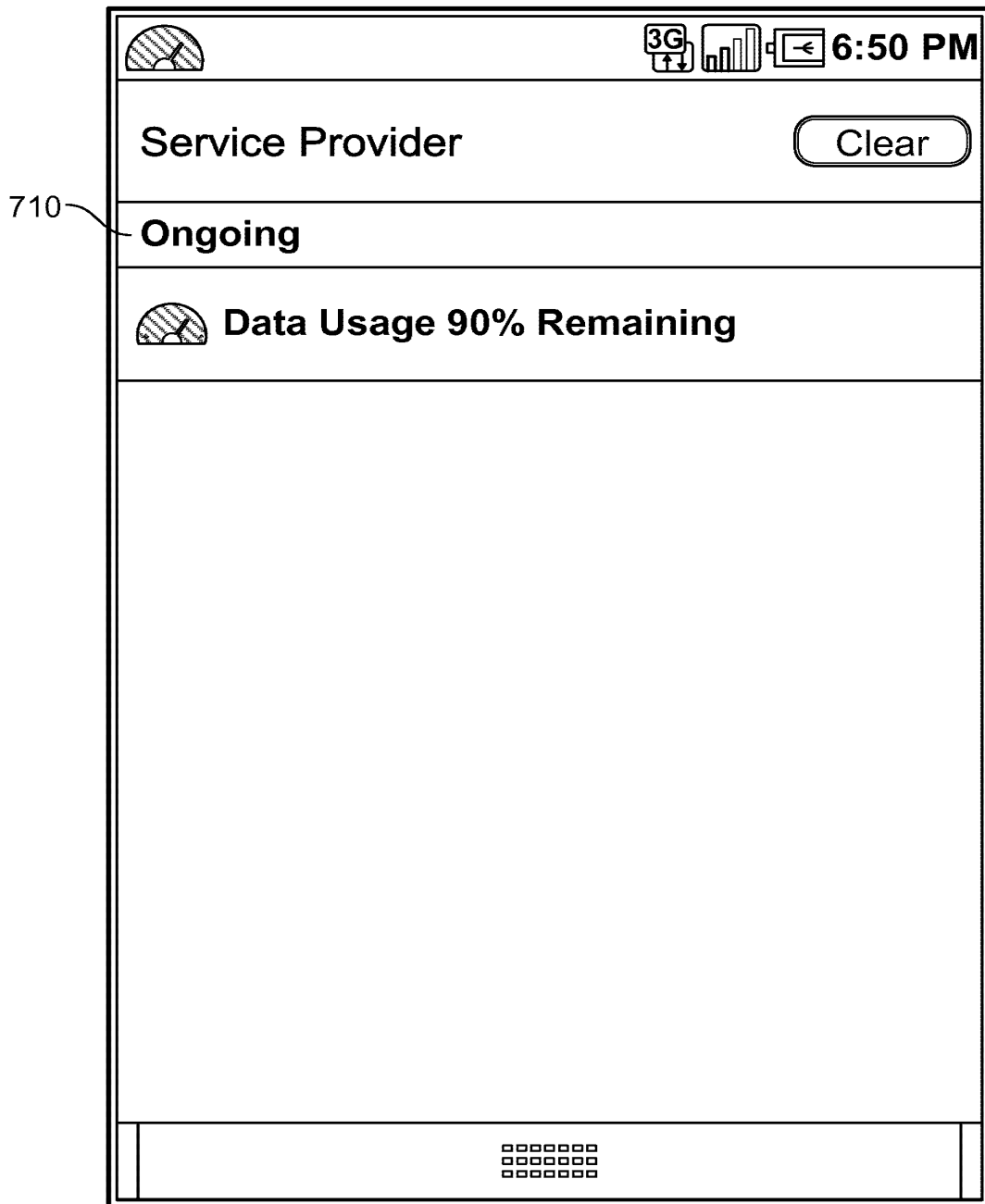


FIG. 7

800

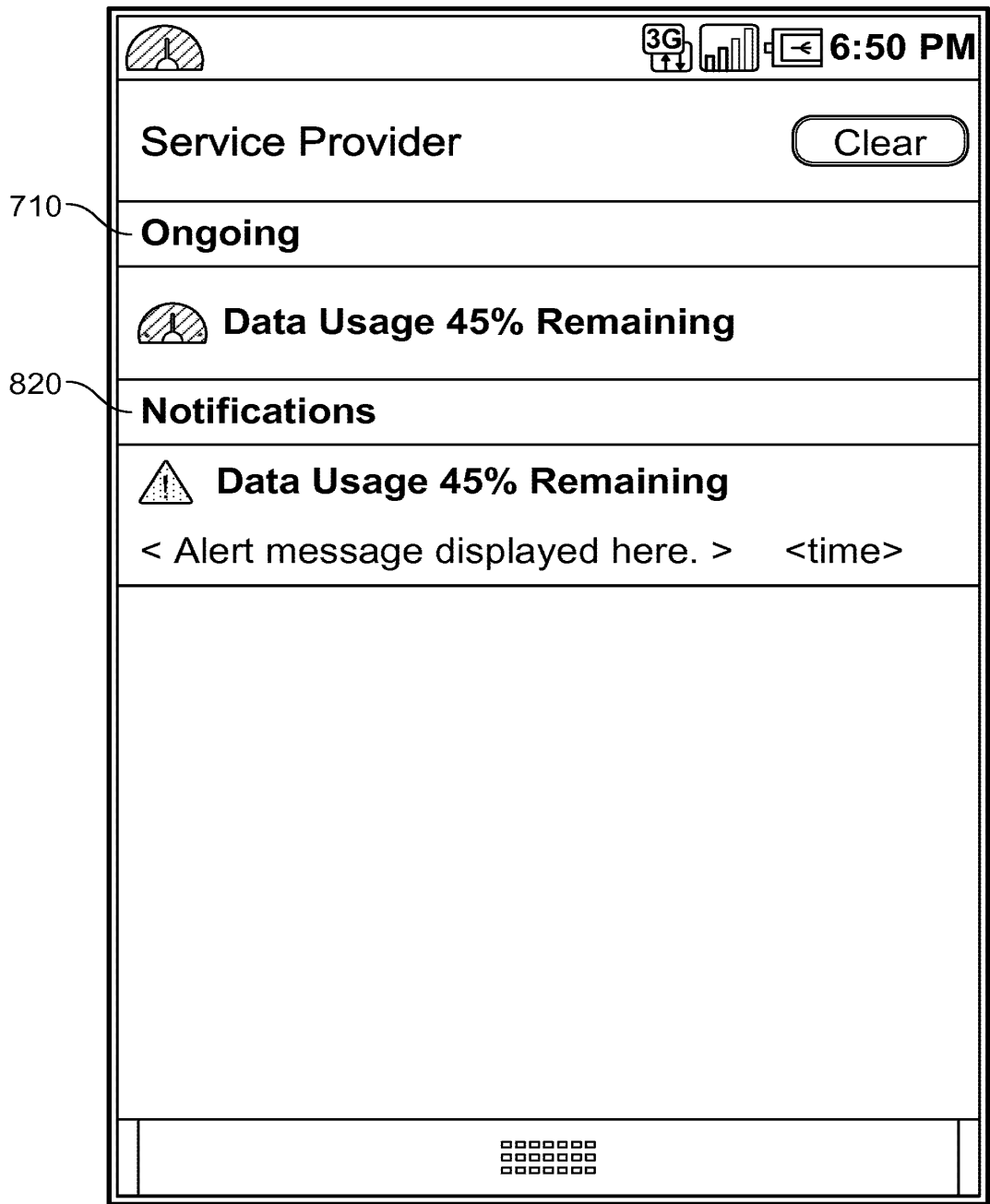


FIG. 8

900

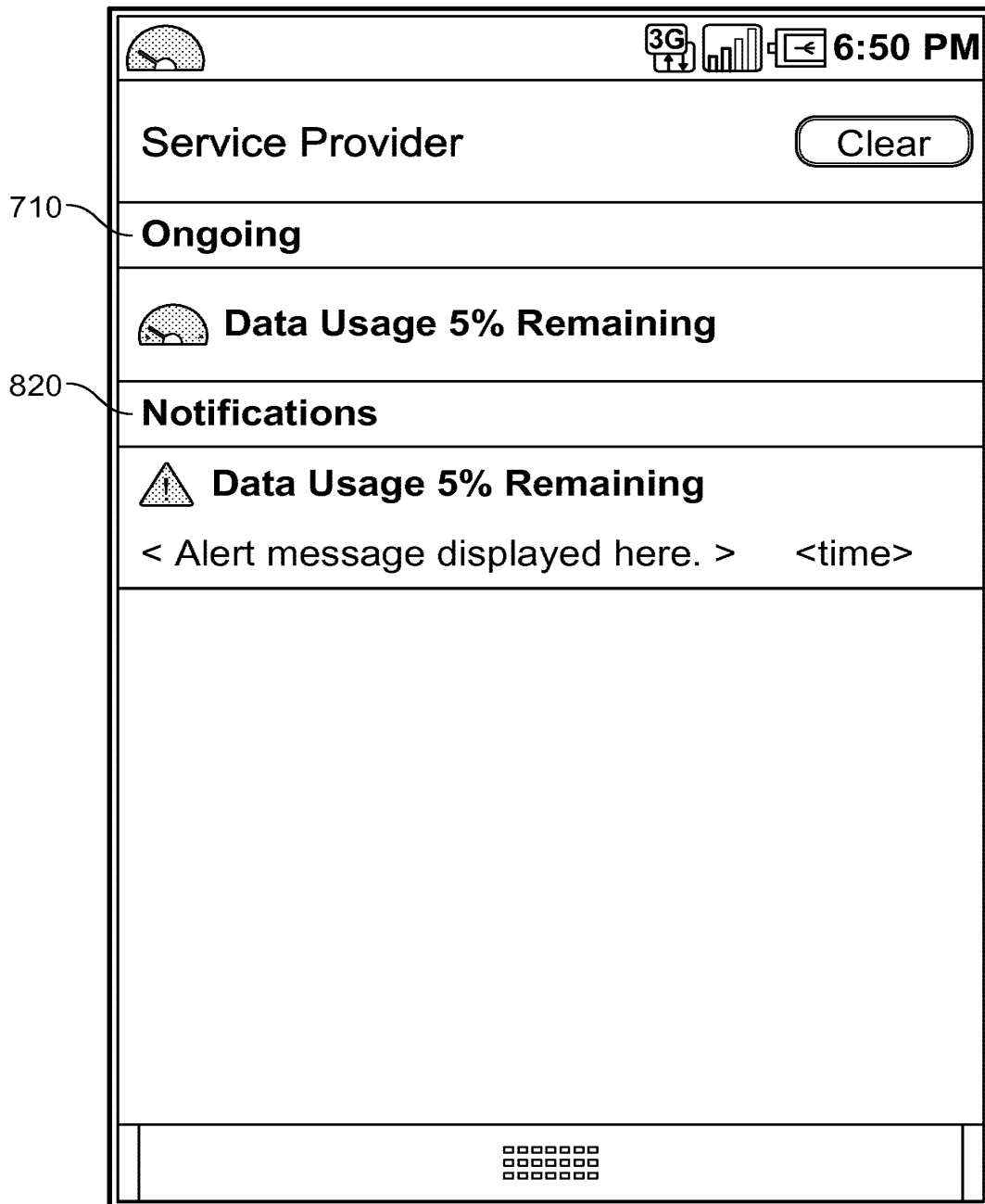


FIG. 9

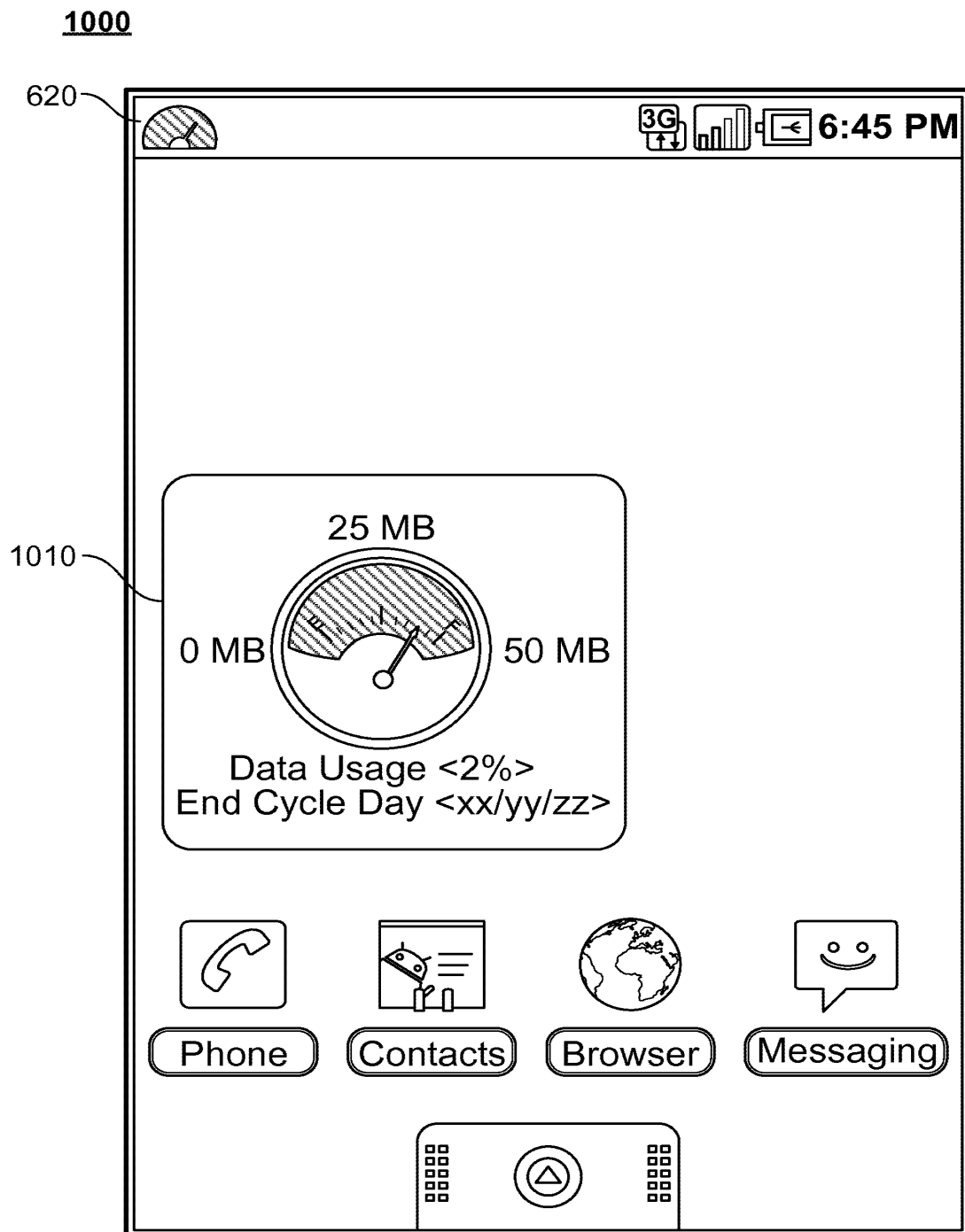


FIG. 10

1100

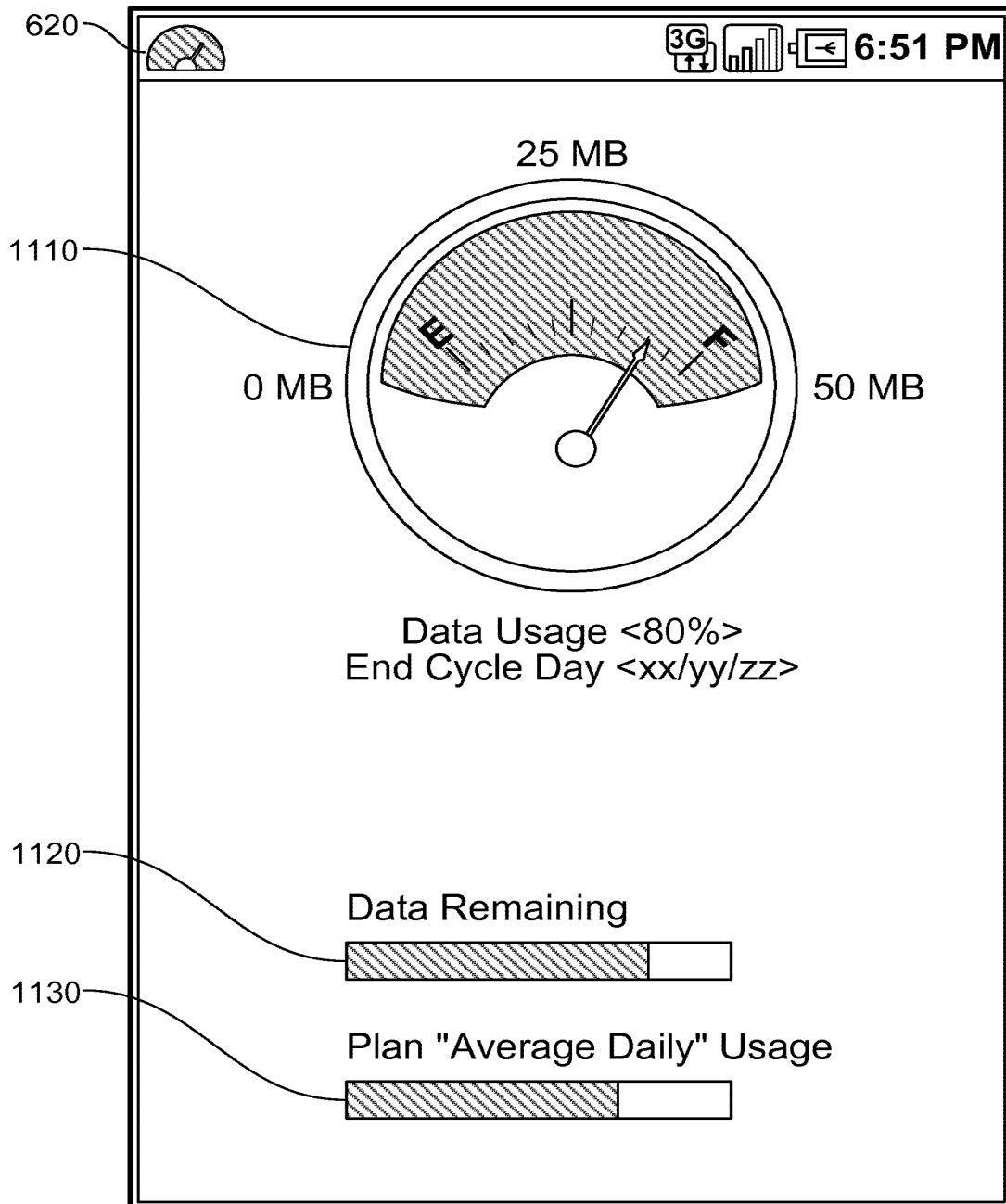


FIG. 11

1200

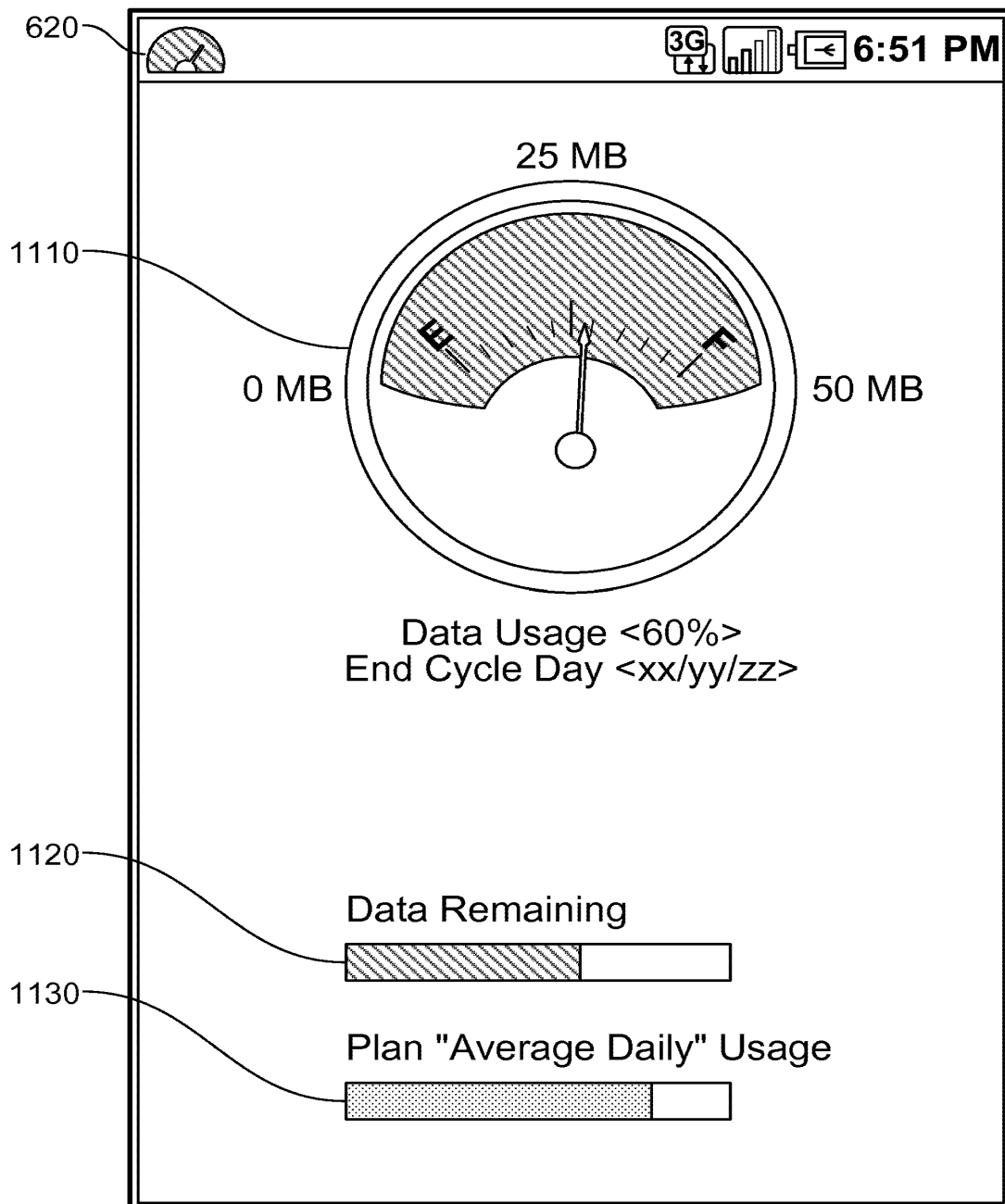


FIG. 12

1300

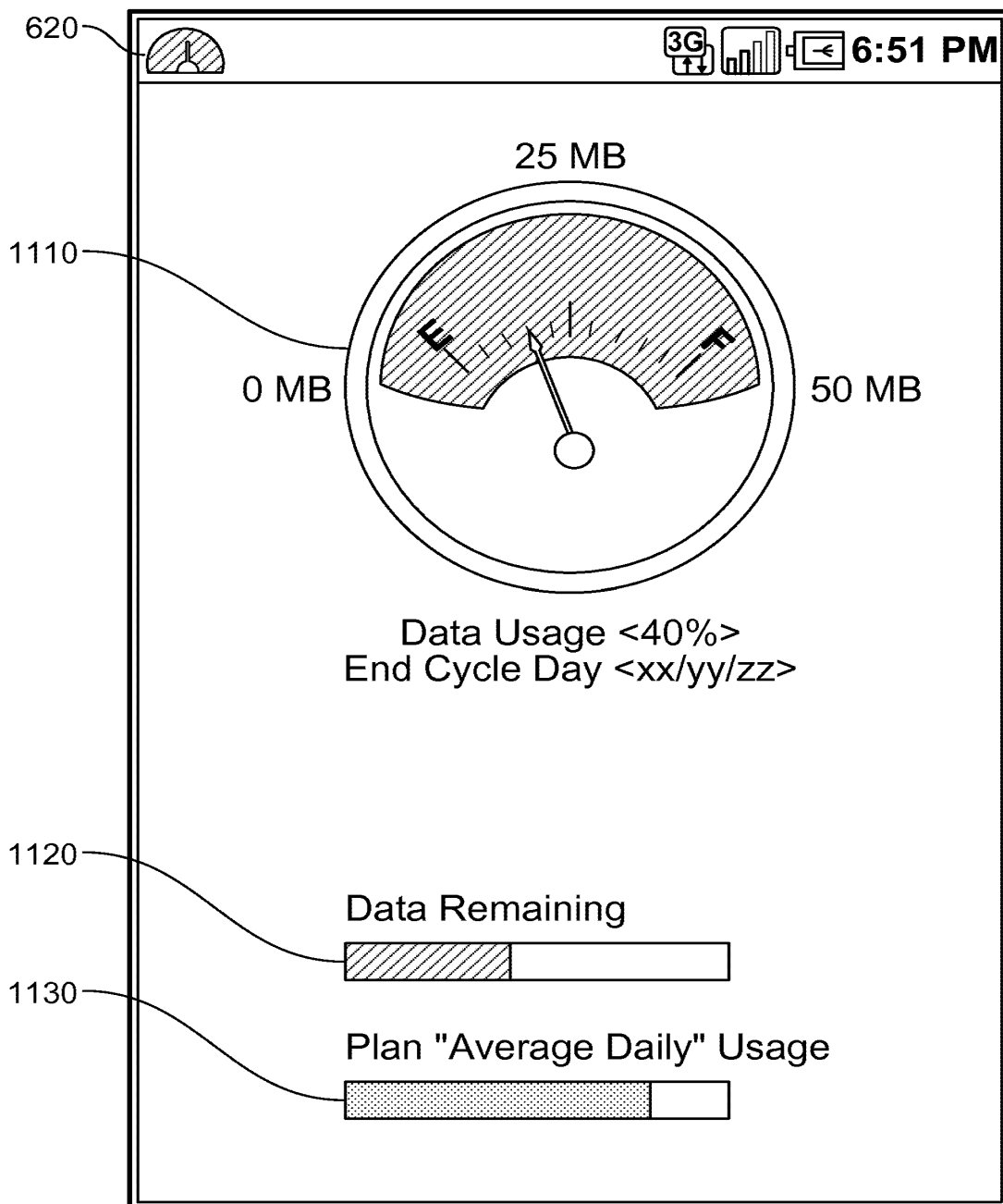


FIG. 13

1400

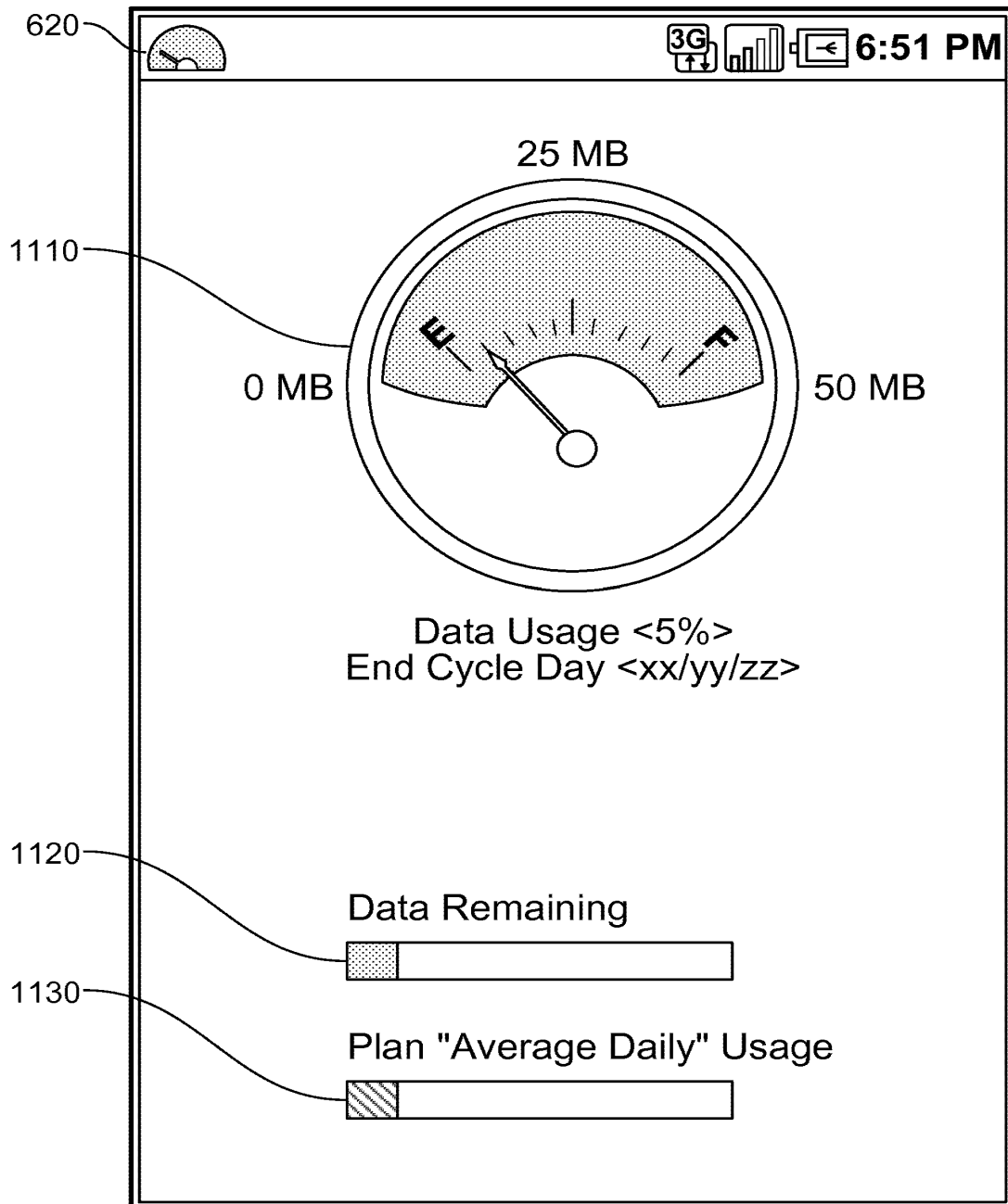


FIG. 14

1500

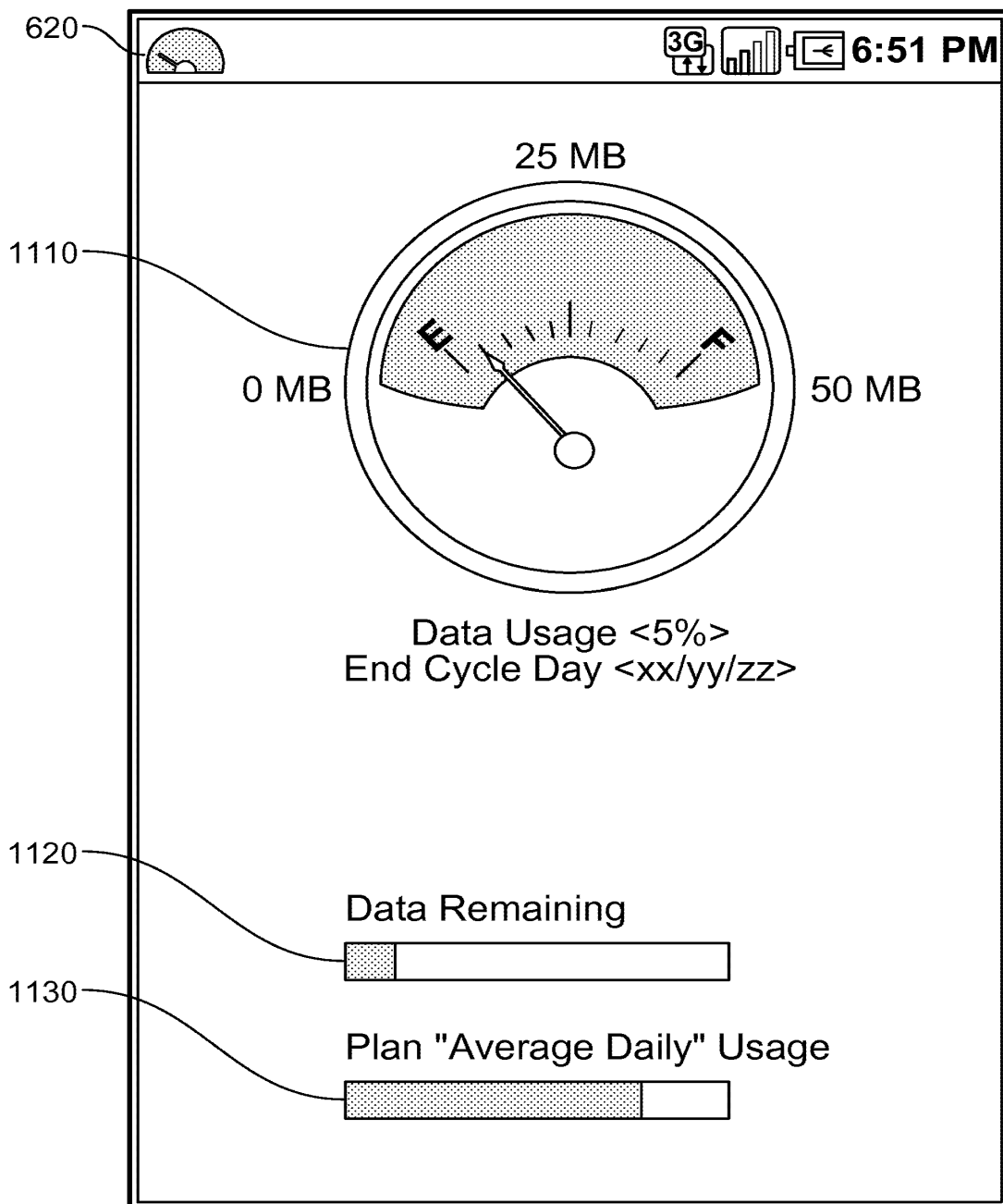


FIG. 15

1600

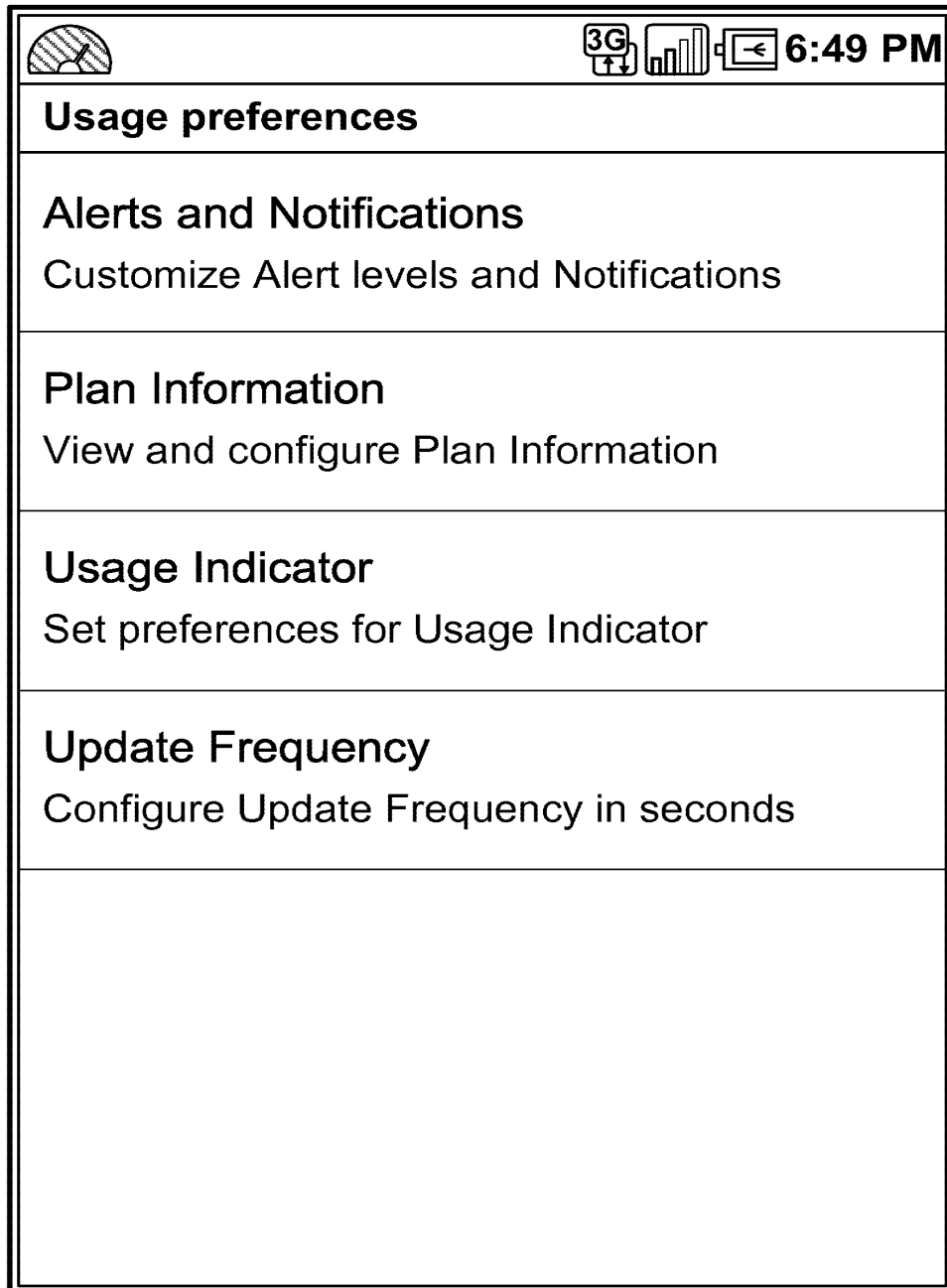


FIG. 16

	   6:49 PM
Alert Customization	
User Alert 1: <50%> Message: <Data Usage is 50%>	
User Alert 2: <75%> Message: <Data Usage is 75% >	
User Alert 3: <95%> Message: <Alert: Low on data - you should buy more data. >	
User Alert 4: <100%> Message: <Alert: Data Usage is 0% - buy more data. >	

FIG. 17

1800

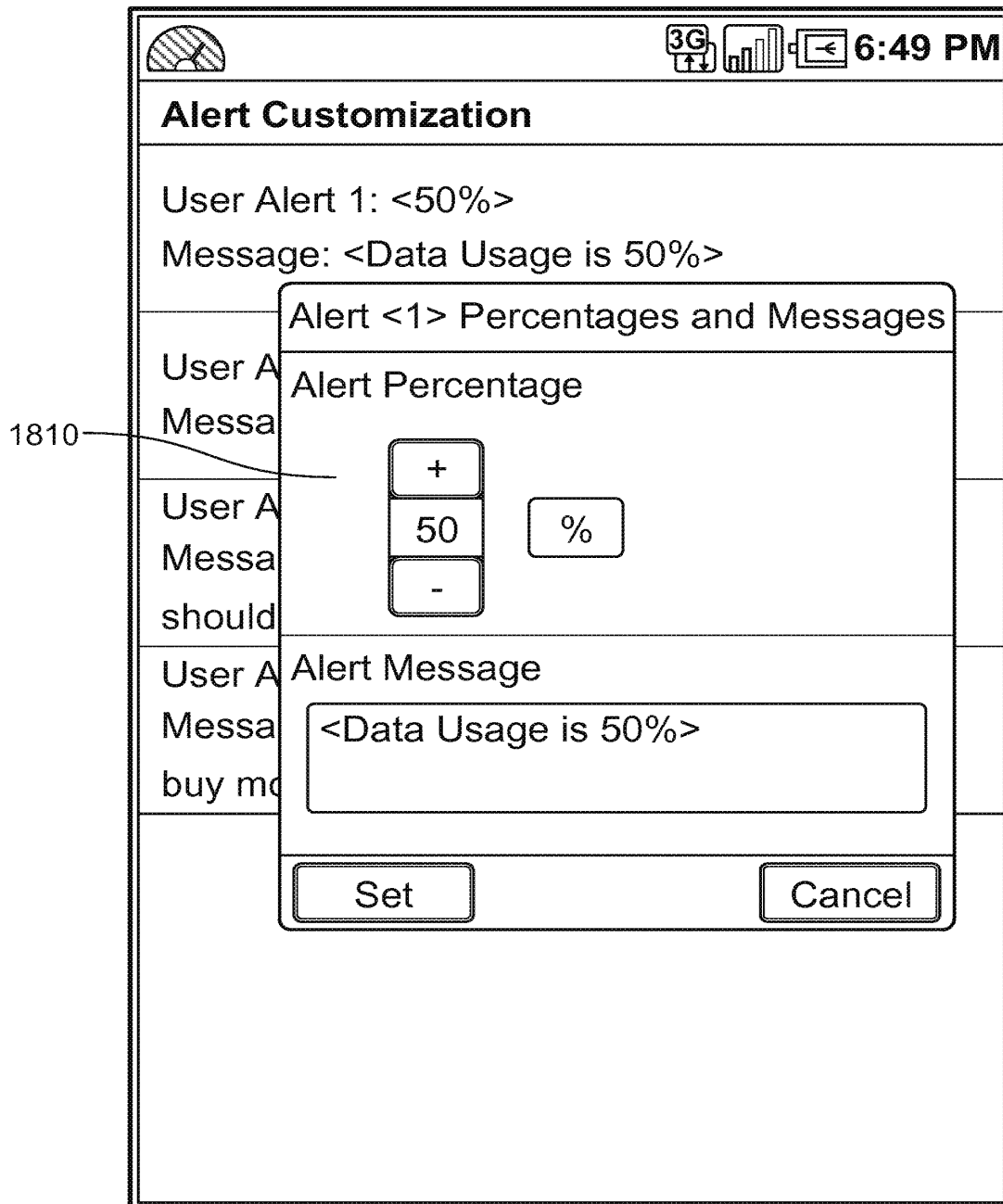


FIG. 18

1900

	   6:49 PM
Plan information	
Cycle End Day <xx/yy/zzzz>	
Monthly Allowance <50> MB	

FIG. 19

2000

6:49 PM

Usage indicator preferences

Icon Always in Source Tray

☒

Sound

☒

Vibrate

☒

FIG. 20

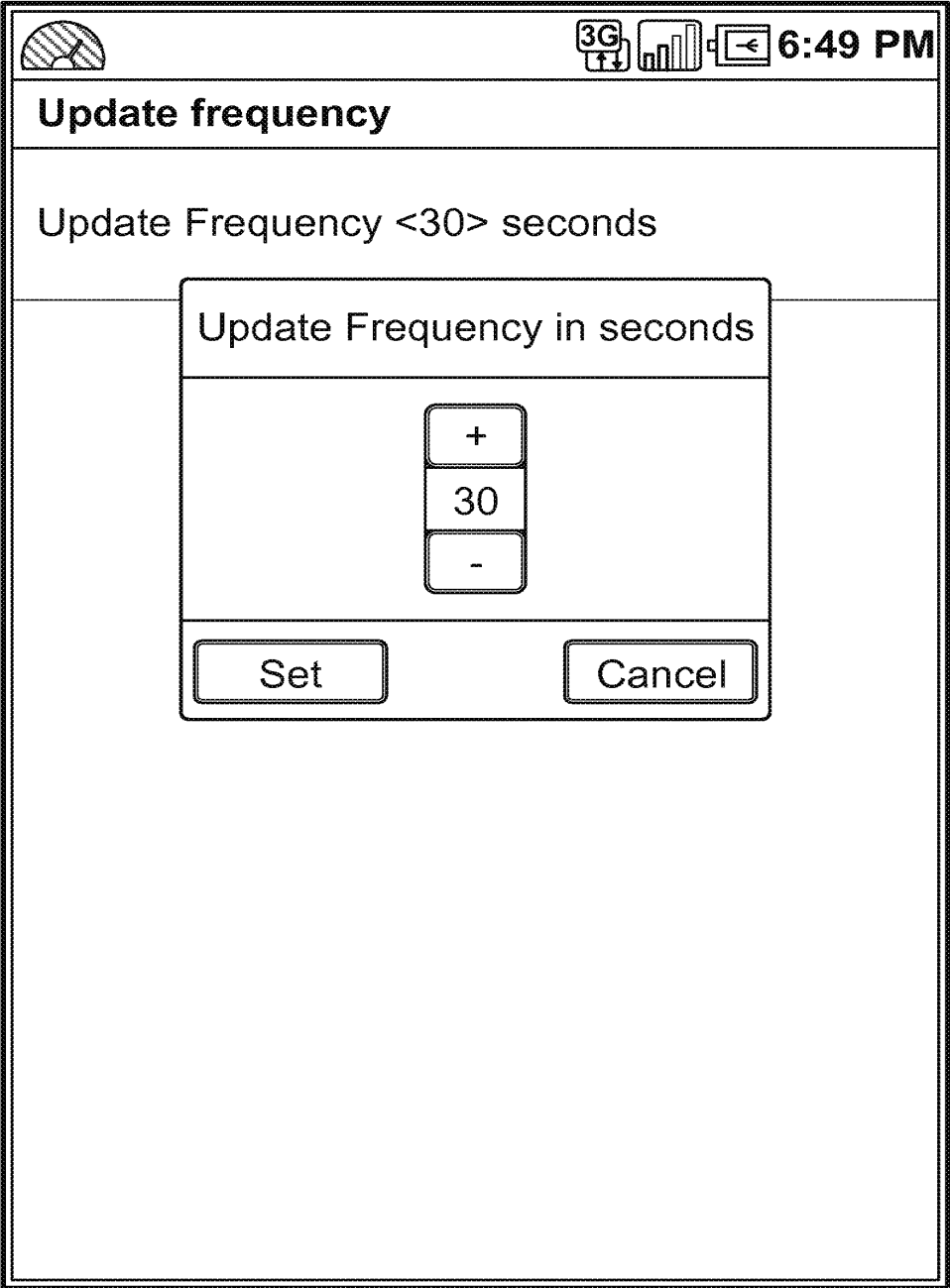


FIG. 21

2200

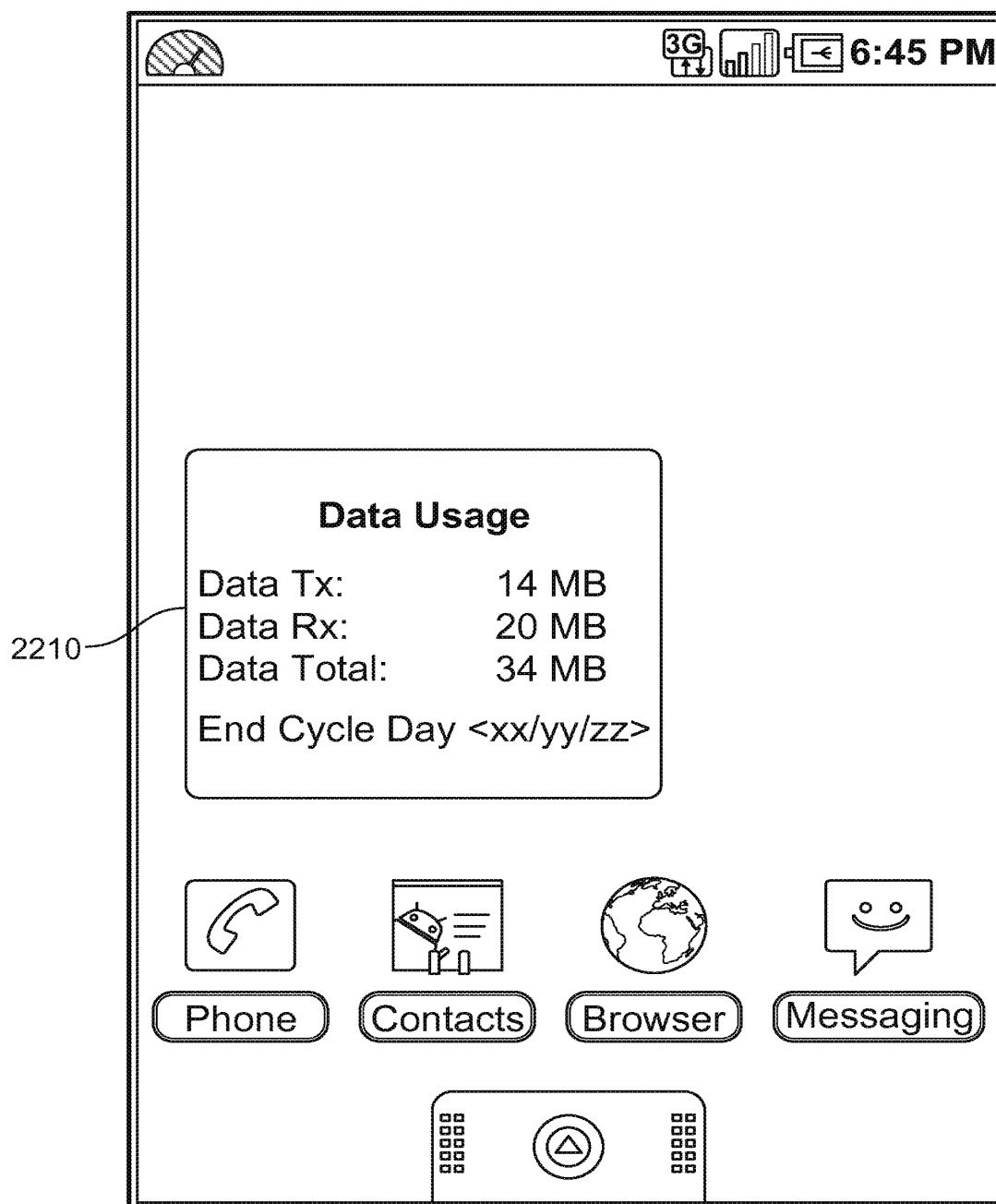


FIG. 22

2300

		   6:51 PM	
Unlimited Plan Usage			
Bytes Sent		<14> MB	
Bytes Received		<20> MB	
Bytes Total		<34> MB	
End Cycle Day		<xx/yy/zz>	

FIG. 23

2400

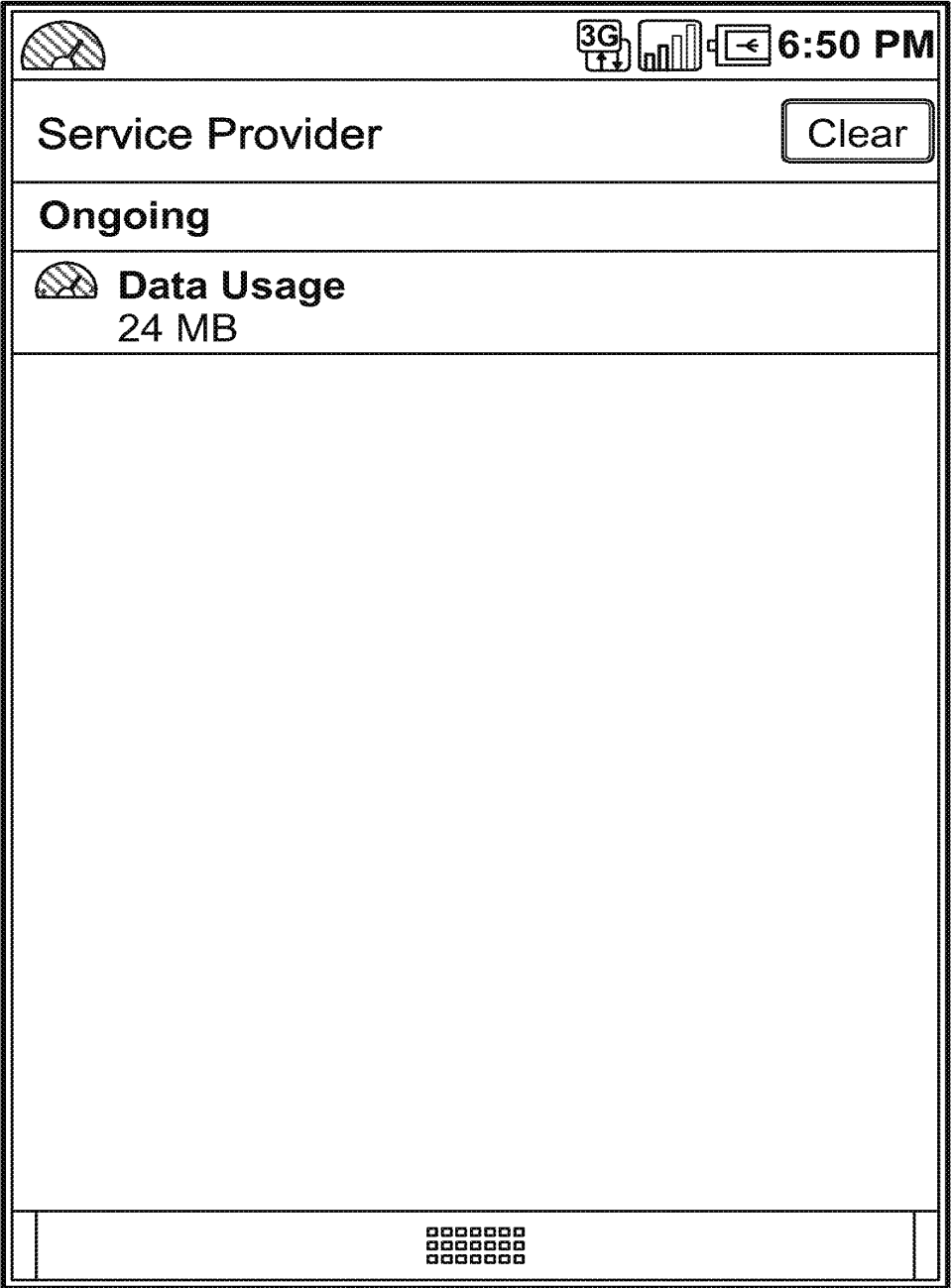


FIG. 24

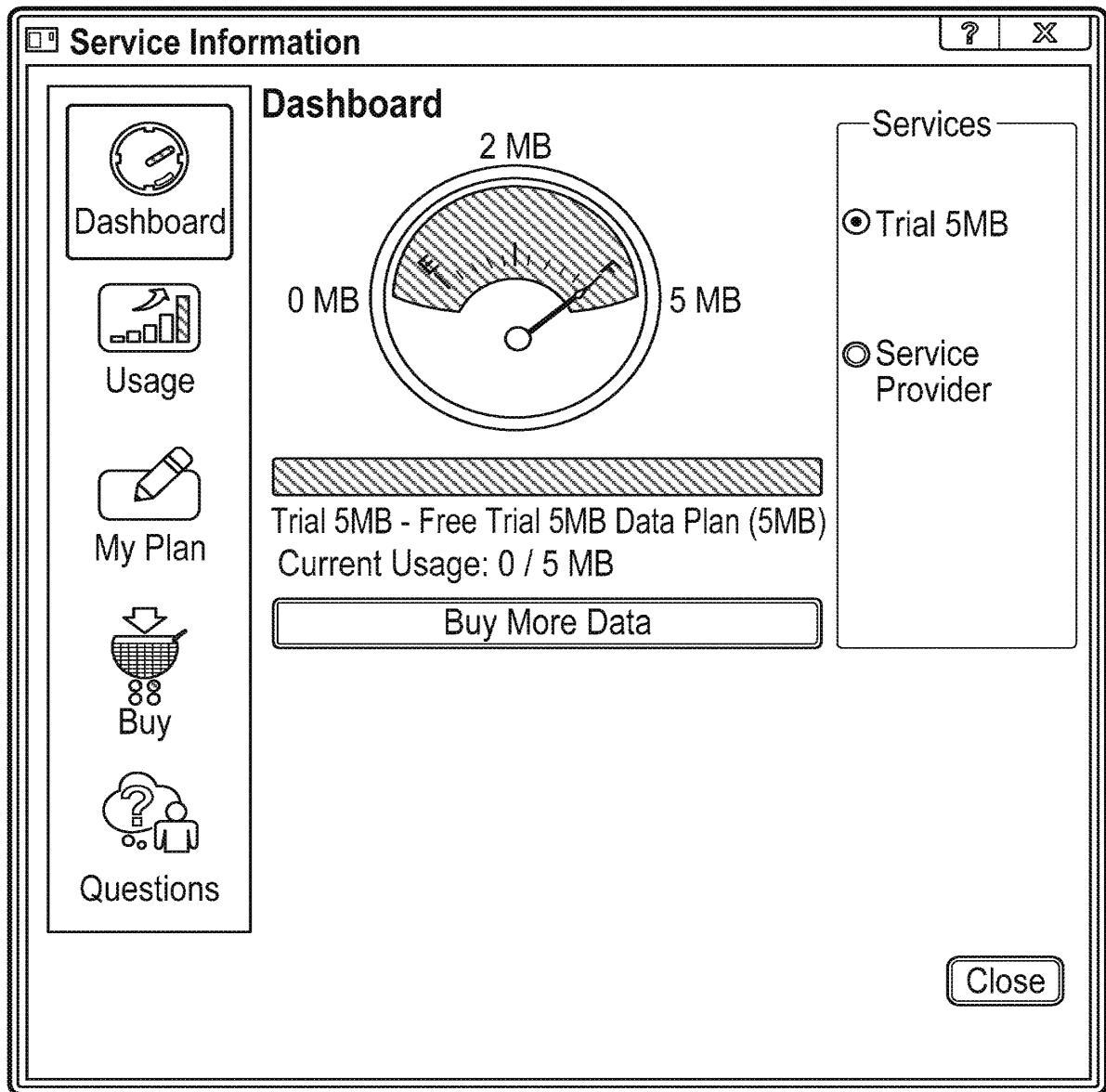


FIG. 25

2600


Dashboard


Usage


My Plan


Buy


Questions

Active Service

Service Type: Sponsored

Service Information

Service: Trial 5MB

Name: Trial 5MB

Description: Free Trial 5MB Data Plan

Details: Free Trial Internet access

Cap: 5MB

Duration: Prepaid

Close

FIG. 26

2700


Dashboard


Usage


My Plan


Buy


Questions

Active Service

Service Type:

Service Information

Service:

Name:

Description:

Details:

Cap:

Duration:

Close

FIG. 27

2800

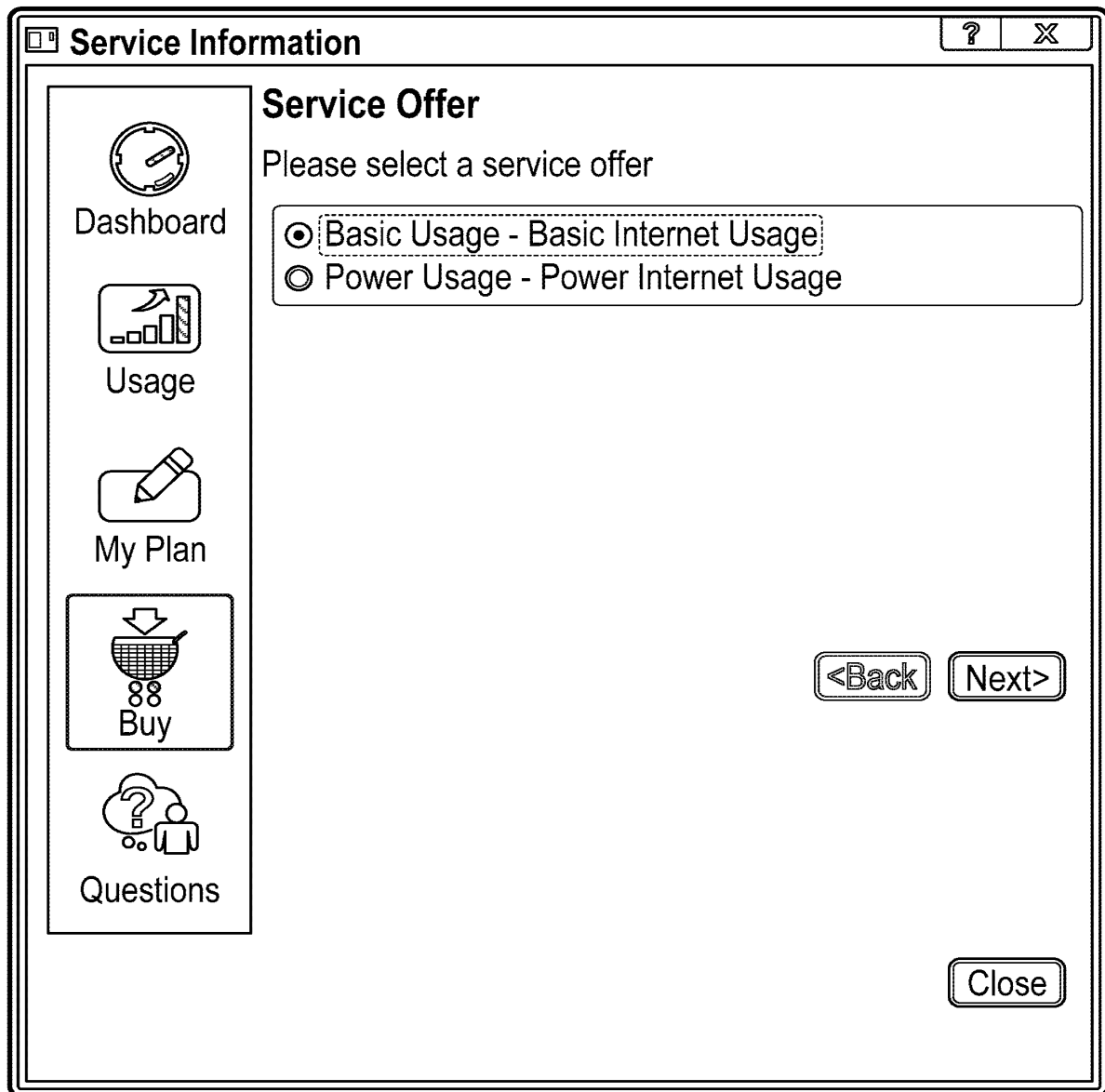


FIG. 28

2900

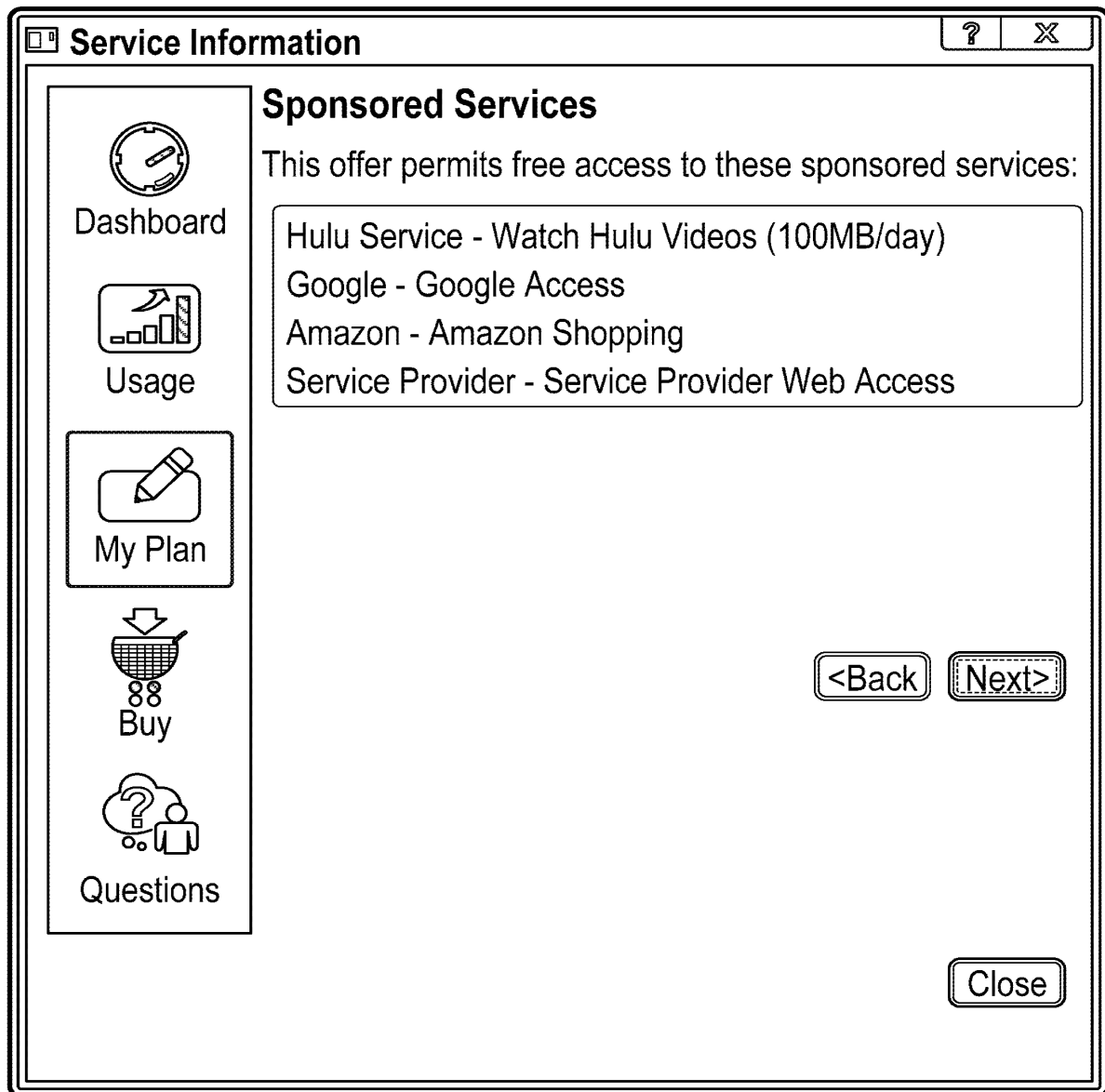


FIG. 29

3000


Dashboard


Usage


My Plan


Buy


Questions

Individual Services

Please select one or more services. Click on "Service Details" for more information regarding these services.

☐ \$2.00 You Tube - YouTube Video Service

☒ \$5.99 NY Times - New York Times Service

☐ \$24.99 Email Anytime - Email Anytime Service

☐ \$9.99 Off-peak Email - Off-peak Email Service

☒ \$9.99 Off-peak Browsing - Off-peak Browsing Service

☐ \$19.99 Browse Anytime - Browse Anytime Service

☐ \$19.99 Prepaid 20MB - 20MB data plan

☒ \$29.99 Prepaid 50MB - 50MB data plan

Service Details

<Back

Next>

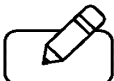
Close

FIG. 30

 **Service Information**


Dashboard


Usage


My Plan


Buy


Questions

Data Usage Patterns

Certain services would like to collect detailed usage information. Select "Opt In" to allow these services to collect this data.

Google

☐ Opt In
☒ Opt Out

Amazon

☐ Opt In
☒ Opt Out

Service Provider

☒ Opt In
☐ Opt Out

<Back

Next>

Close

FIG. 31

Page 176 of 196

3200

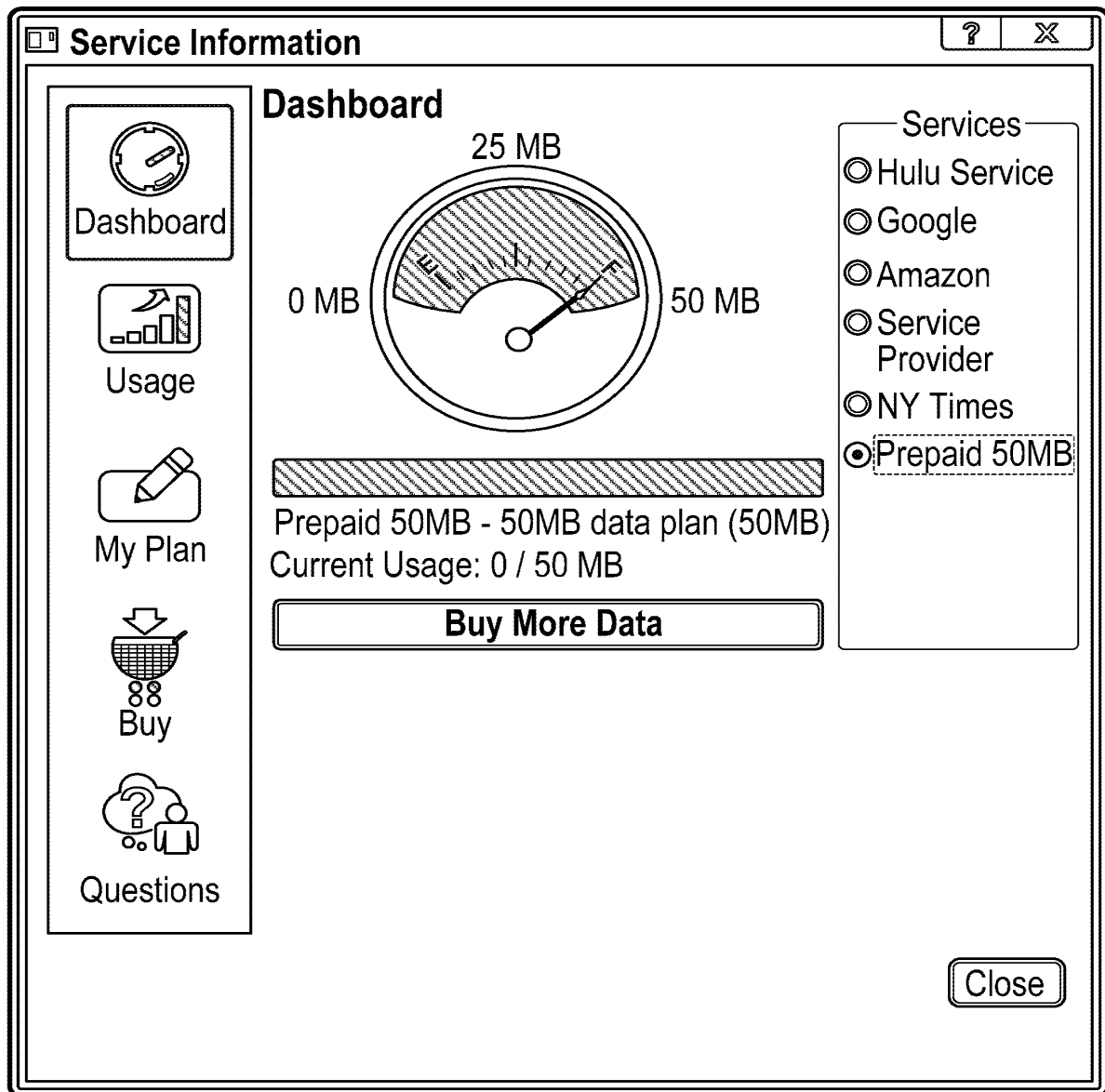


FIG. 32

3300

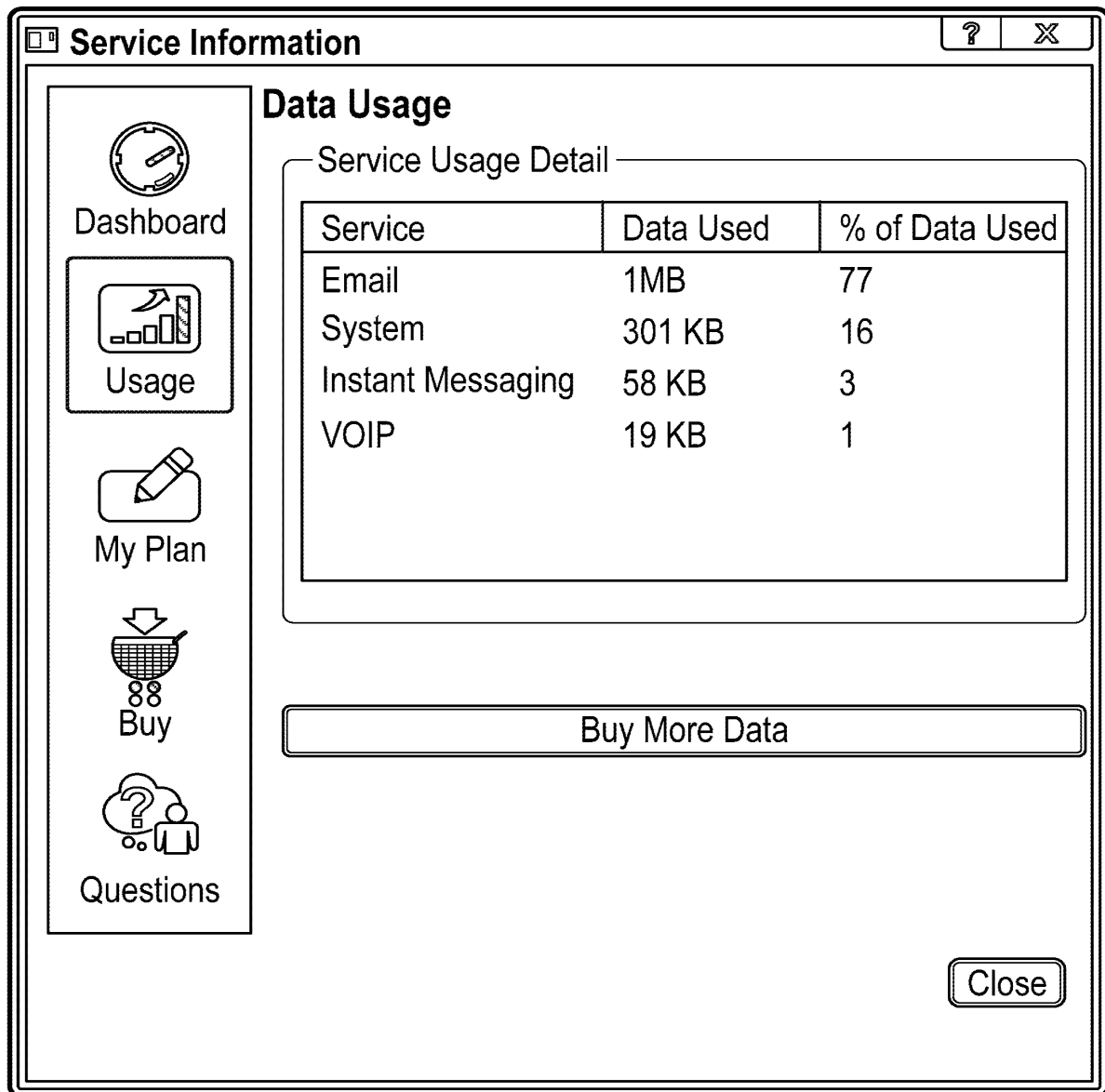


FIG. 33

3400

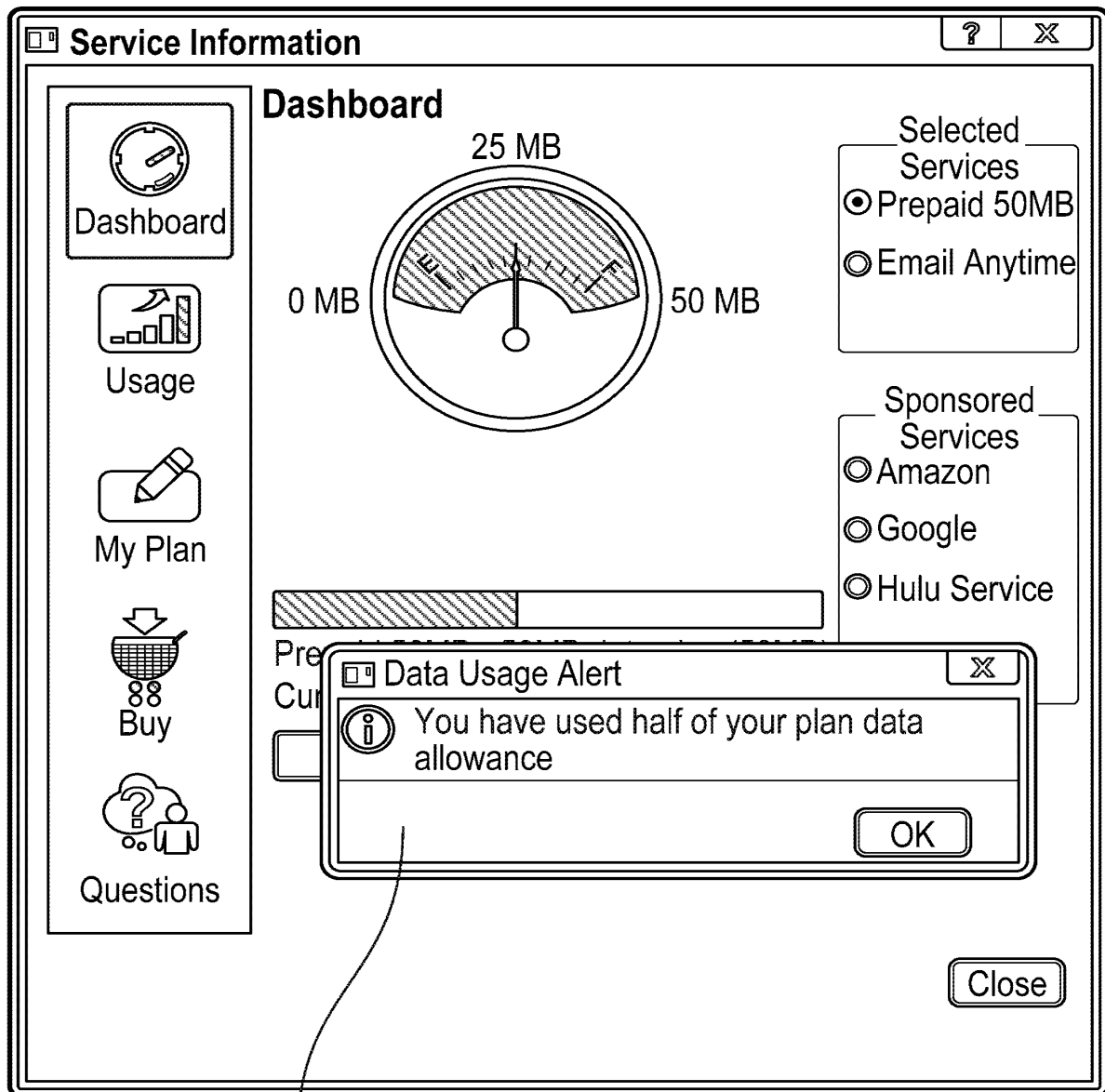
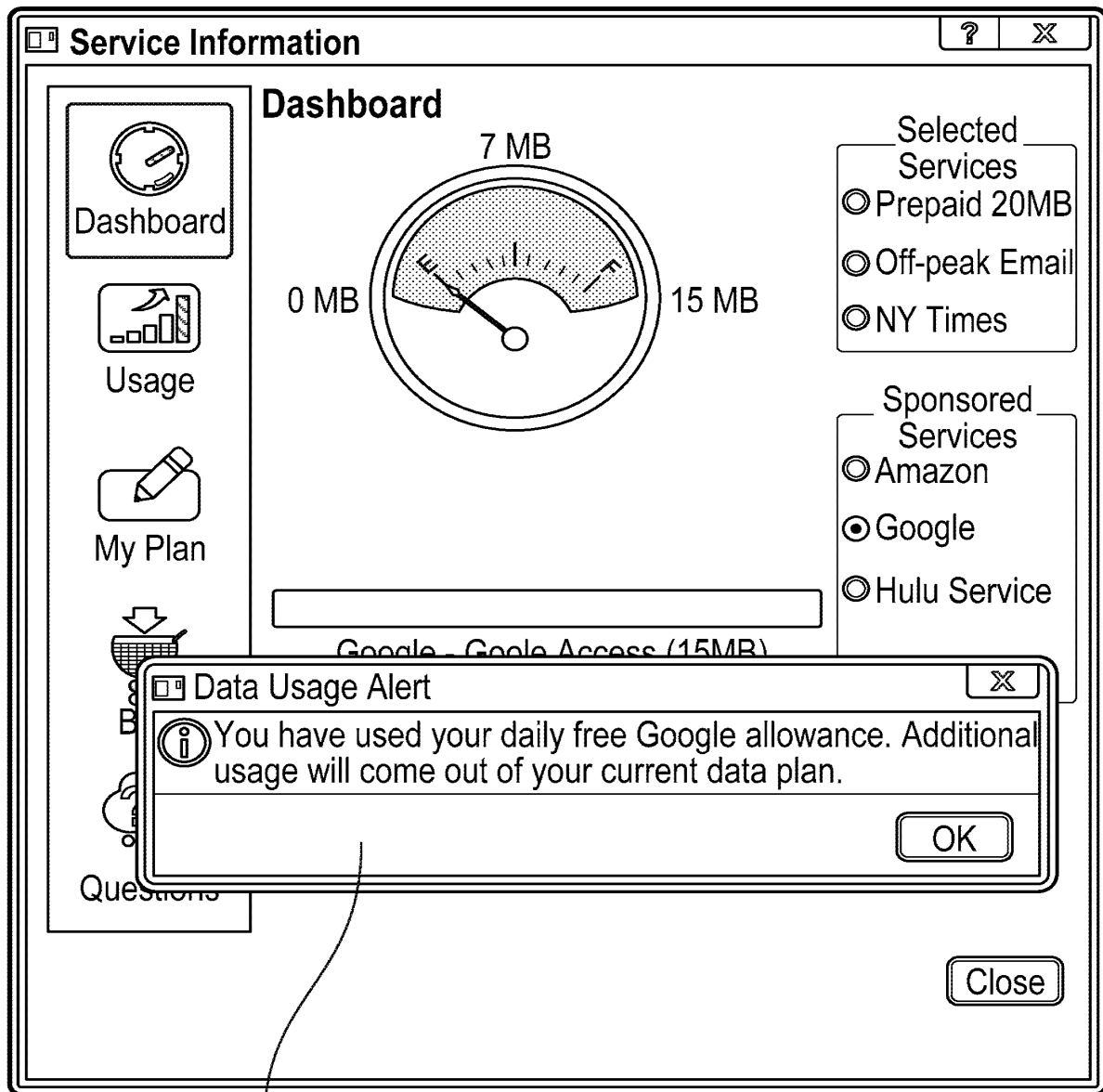


FIG. 34

3500



3510

FIG. 35

3600

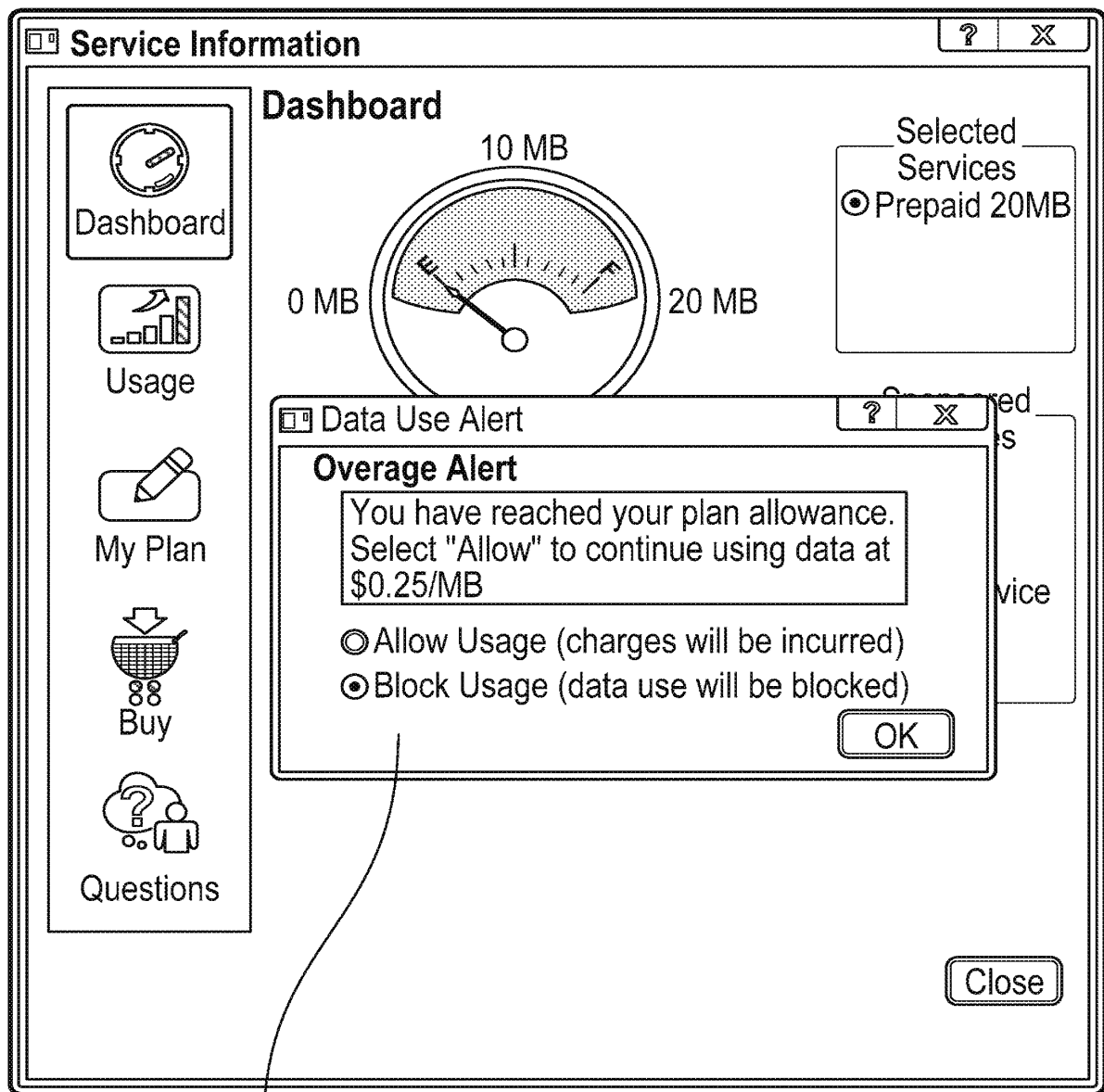


FIG. 36

3610

3700

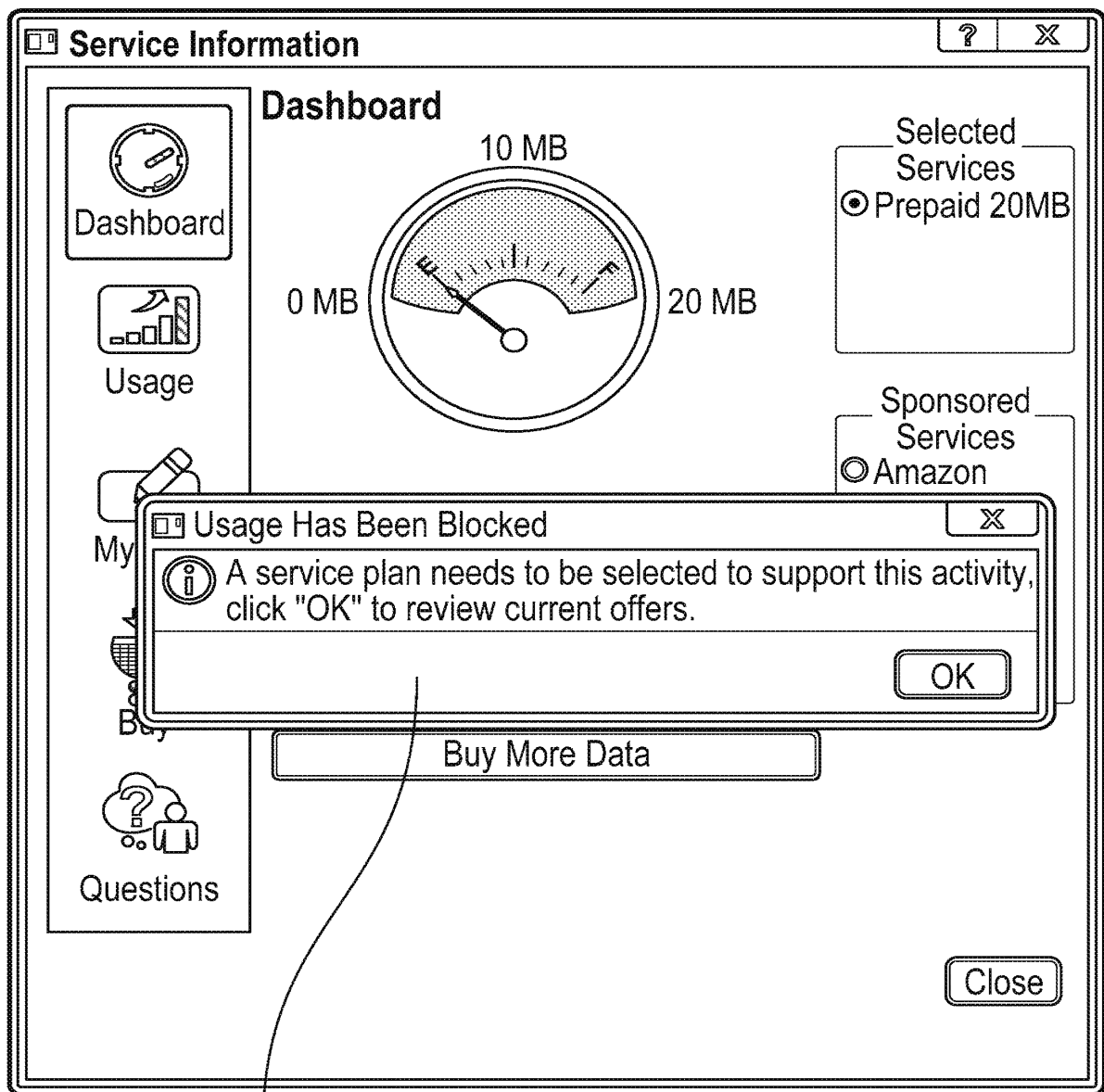


FIG. 37

3710

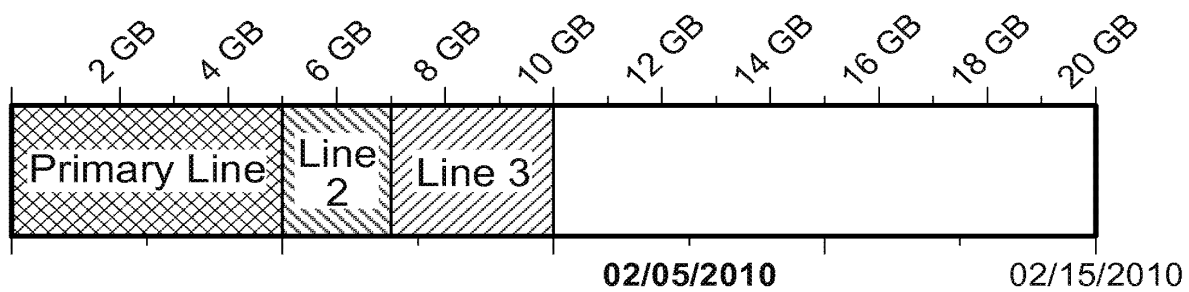


FIG. 38A

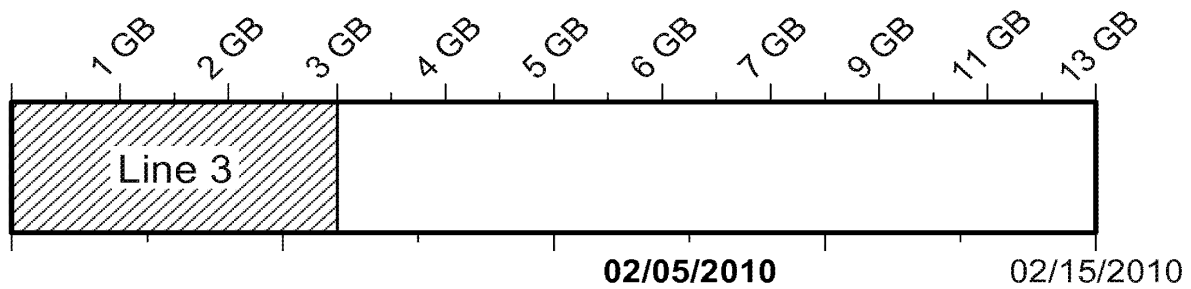


FIG. 38B

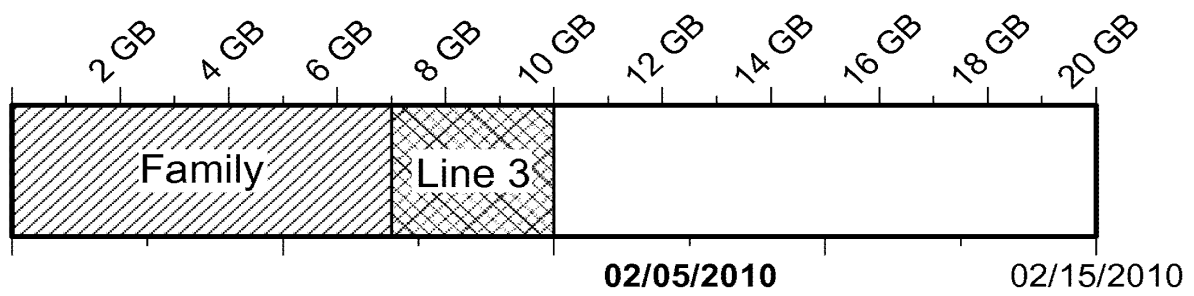


FIG. 39

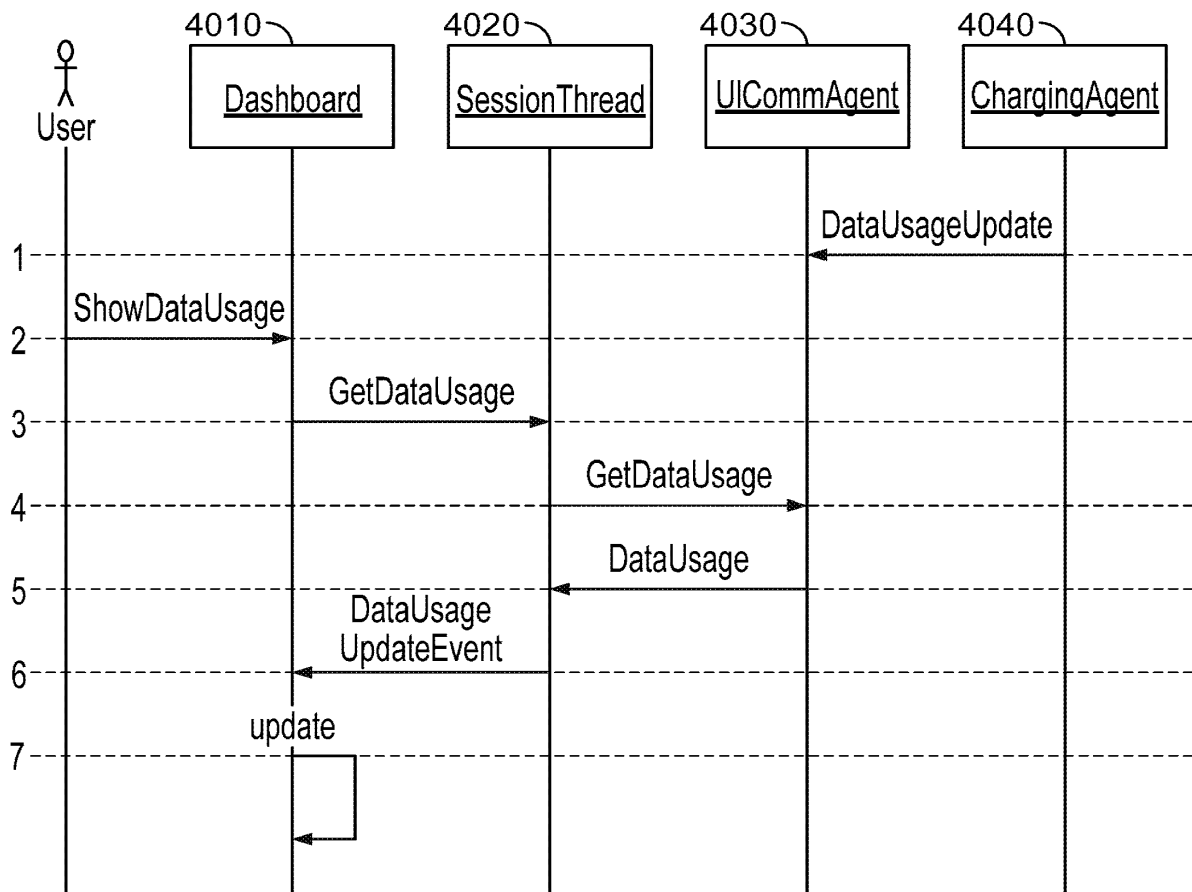


FIG. 40

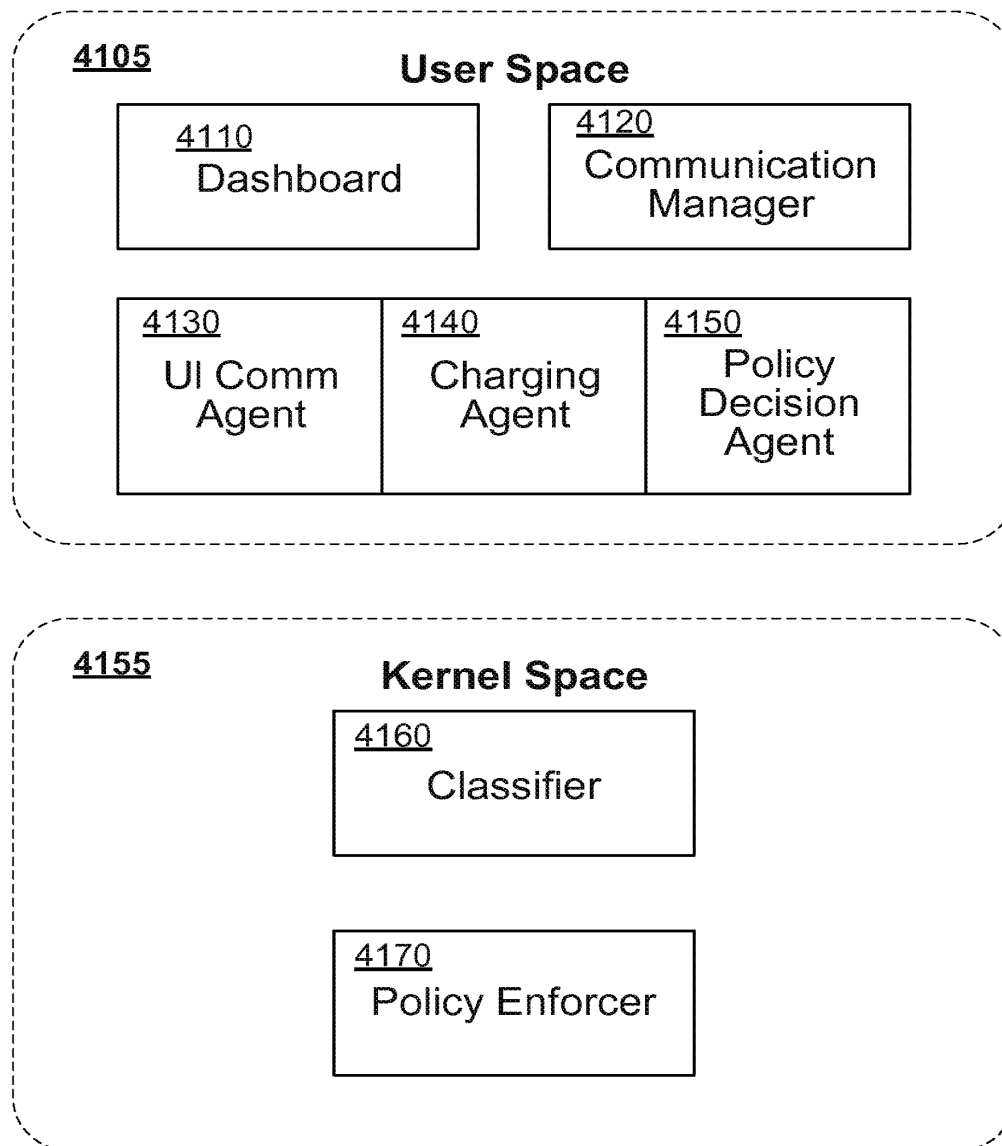


FIG. 41

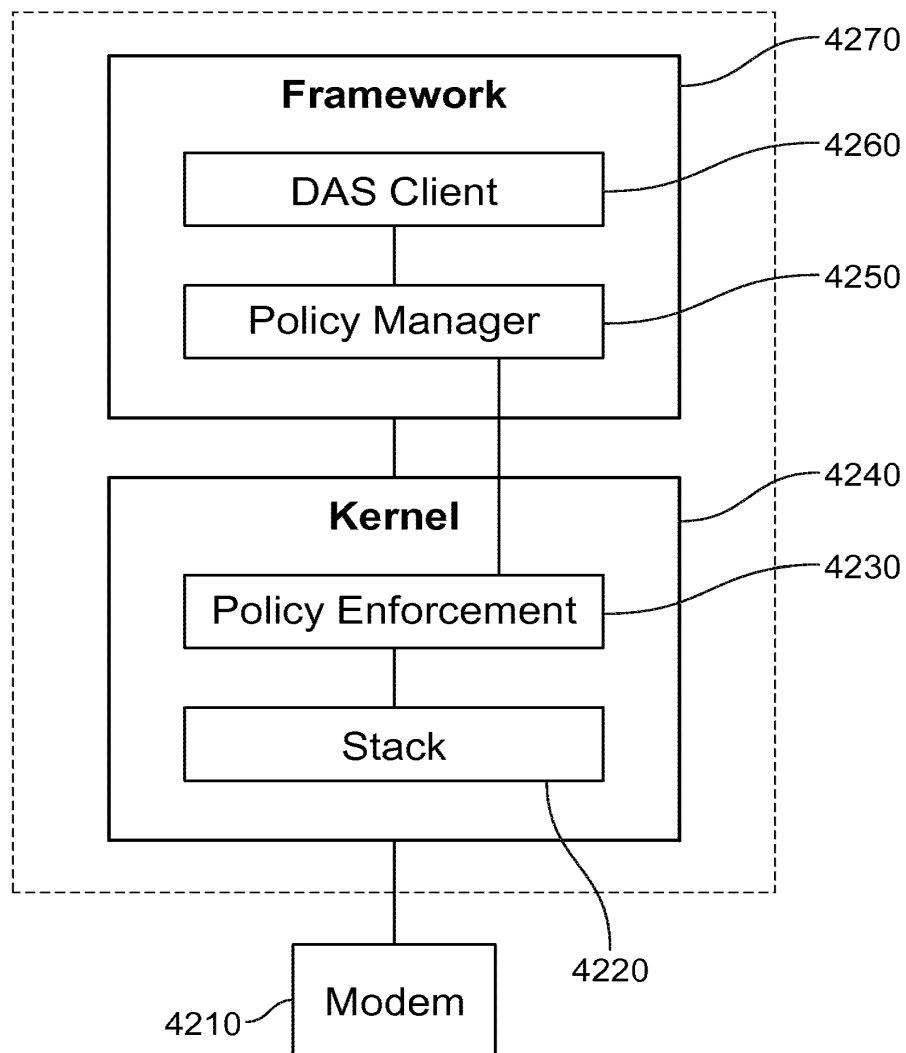


FIG. 42

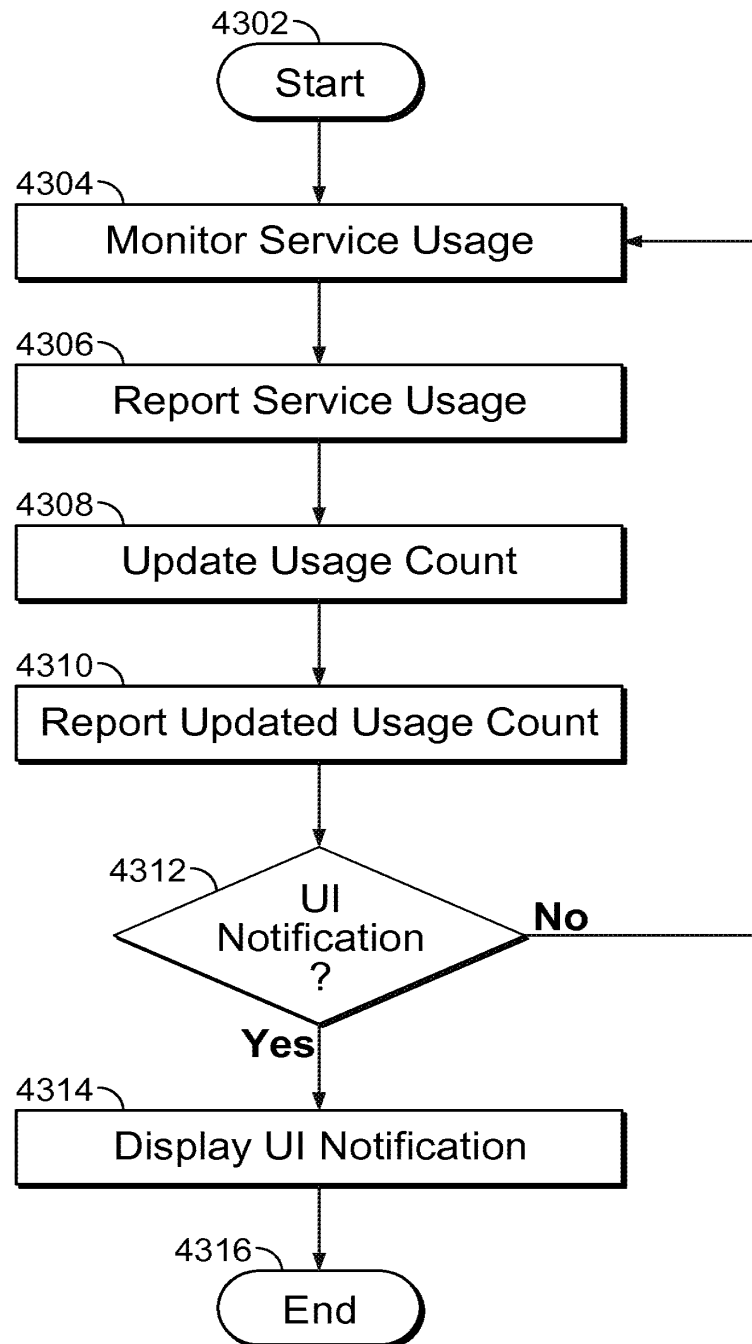


FIG. 43

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES		
First Named Inventor/Applicant Name:		Gregory G. Raleigh		
Filer:		Michael J. Schallop/Veronica Pula		
Attorney Docket Number:		RALEP035+		
Filed as Large Entity				
Provisional Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional application filing	1005	1	220	220
Pages:				
Prov. Appl Size fee per 50 sheets >100	1085	1	270	270
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				490

Electronic Acknowledgement Receipt	
EFS ID:	8539740
Application Number:	61389547
International Application Number:	
Confirmation Number:	1918
Title of Invention:	USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES
First Named Inventor/Applicant Name:	Gregory G. Raleigh
Customer Number:	21912
Filer:	Michael J. Schallop/Veronica Pula
Filer Authorized By:	Michael J. Schallop
Attorney Docket Number:	RALEP035+
Receipt Date:	04-OCT-2010
Filing Date:	
Time Stamp:	17:14:25
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$490
RAM confirmation Number	3754
Deposit Account	500685
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees) Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Provisional Cover Sheet (SB16)	RALEP035plus_Provisional_Application_Coversheet.pdf	1000054	no	3
			4f610639606ff7c1dcab76f42ac61dd119ea344b		
Warnings:					
Information:					
2		RALEP035plus_App.pdf	415815	yes	133
			a3f29bf1b45a9909a3b05a1a03505b9ee5c2a82f		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal of New Application		1	1	
	Specification		2	127	
	Claims		128	132	
	Abstract		133	133	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	RALEP035plus_Figures.pdf	1228052	no	52
			57e948e5711c59f968ae3ee5bfd63197ec07ac84		
Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	31270	no	2
			3ee008440e4b41ac4016e204392e396ea9adbdd		
Warnings:					
Information:					
Total Files Size (in bytes):			2675191		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name	Middle Name	Family Name	City	State	Country i
Gregory	G.	Raleigh	Woodside	CA	US

Inventor 2

Remove

Given Name	Middle Name	Family Name	City	State	Country i
Alireza		Raissinia	Monte Sereno	CA	US

Inventor 3

Remove

Given Name	Middle Name	Family Name	City	State	Country i
James		Lavine	Marin	CA	US

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.**Add****Title of Invention**

USER NOTIFICATIONS FOR DEVICE ASSISTED SERVICES

Attorney Docket Number (if applicable)

RALEP035+

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number
 ☐ Firm or Individual Name

Customer Number

21912

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Entity Status

Applicant claims small entity status under 37 CFR 1.27

- ☐ Yes, applicant qualifies for small entity status under 37 CFR 1.27
- ☒ No

Warning

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Michael J. Schallop/			Date (YYYY-MM-DD)	2010-09-30
First Name	Michael J.	Last Name	Schallop	Registration Number (If appropriate)	44319

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that : (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.