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FILING RECEIPT



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If Required, Foreign Filing License Granted: 09/09/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/275,208**

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Title

Adaptive ambient services

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ATTORNEY DOCKET NO. RALEP023+

IN THE U.S. PATENT AND TRADEMARK OFFICE
Provisional Application Cover Sheet

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

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

INVENTOR(s)/APPLICANT(s)

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TITLE OF THE INVENTION

ADAPTIVE AMBIENT SERVICES

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ENCLOSED APPLICATION PARTS (check all that apply)

- (X) Specification *Number of Pages* 26
(X) Drawing(s) *Number of Pages* 7
() Power of Attorney
() Additional inventors are being named on separately numbered sheets attached hereto.

METHOD OF PAYMENT

(X) A check in the amount of \$220.00 to cover the filing fee is enclosed.

(X) At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account No. 50-0685 (Order No. RALEP023+).

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Date of Deposit: August 25, 2009

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By Stephanie Valenzuela
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PROVISIONAL APPLICATION FOR UNITED STATES PATENT

ADAPTIVE AMBIENT SERVICES

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ADAPTIVE AMBIENT SERVICES

CROSS REFERENCE TO OTHER APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application No. 61/206,354 (Attorney Docket No. RALEP001+) entitled SERVICES POLICY COMMUNICATION SYSTEM AND METHOD filed January 28, 2009, U.S. Provisional Patent Application No. 61/206,944 (Attorney Docket No. RALEP002+) entitled SERVICES POLICY COMMUNICATION SYSTEM AND METHOD filed February 4, 2009, U.S. Provisional Application No. 61/207,393 (Attorney Docket No. RALEP003+) entitled SERVICES POLICY COMMUNICATION SYSTEM AND METHOD filed February 10, 2009, U.S. Provisional Patent Application No. 61/207,739 (Attorney Docket No. RALEP004+) entitled SERVICES POLICY COMMUNICATION SYSTEM AND METHOD filed on February 13, 2009, and U.S. Provisional Patent Application No. 61/270,353 (Attorney Docket No. RALEP022+) entitled DEVICE ASSISTED CDR CREATION, AGGREGATION, MEDIATION AND BILLING filed on July 6, 2009, which are incorporated herein by reference for all purposes.

BACKGROUND OF THE INVENTION

[0002] 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.

[0003] 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

[0004] Various embodiments of the invention are disclosed in the following detailed description and the accompanying drawings.

[0005] **Figure 1** illustrates a wireless network architecture for providing adaptive ambient service in accordance with some embodiments.

[0006] **Figure 2** illustrates a wireless network architecture for providing adaptive ambient service including a proxy server in accordance with some embodiments.

[0007] **Figure 3** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments.

[0008] **Figure 4** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments.

[0009] **Figure 5** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments.

[0010] **Figure 6** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments.

DETAILED DESCRIPTION

[0011] 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.

[0012] 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.

[0013] In some embodiments, adaptive ambient services for a device (e.g., any type of device capable of communicating with a wireless network) or use of a service on a wireless network are provided. In some embodiments, an ambient experience is the user experience that is available at the time the device is sold in the event the user has not yet signed up for a service plan or the device is not sold with a prepaid service plan or other required service plan. In some embodiments, an ambient service generally refers to a set of application access, destinations,

sources, and/or traffic control rules to enable an ambient service experience, and, in some embodiments, also includes a set of billing rules to keep an accounting of service usage for different service usages (e.g., various bill by account rules or service usage accounts). For example, the ambient experience can be defined by an ambient service profile, an ambient service plan and/or the other service usage activity control policies in effect in the network, on the device, on an intermediate networking device, or any combination thereof.

[0014] For example, if a service processor (e.g., on the device, the intermediate networking device, or both) is used in large part to define the ambient service profile, then the initial provisioning and activation settings in the service processor, and possibly a service controller in the network, can define the user service upgrade offering choices, network destination access control possibilities, traffic control policies, mobile commerce transaction capabilities (e.g., which transaction websites, WAP sites or portals the user can access to purchase information, content, music, games and/or eBooks), possibly free news or weather or other modest bandwidth Internet services that are provided free of charge to entice the user into using/upgrading the service or using the transactions or viewing advertisements, what advertisements are displayed to the user or what advertisement based websites the user is exposed to, certain applications may have access while others are blocked (e.g., Internet based text services have access but email downloads do not), or various other example service capabilities related to, for example, any set of application access, destinations, sources, traffic control rules to enable an ambient service experience, and/or a set of billing rules to keep an accounting of service usage for different service usages (e.g., various bill by account rules or service usage accounts).

[0015] In some embodiments, allowing some or all of these services, and blocking or throttling other ambient user service attempts (e.g., unpaid large file size Internet downloads or uploads or movie viewing or other access that would consume bandwidth and cause the ambient service to be a potential source of losses for the service provider) is made possible, for example, by various service profile control capabilities of the service processor and/or the service controller or using various other techniques. In some bill by account embodiments, as discussed herein, in which each service activity can, for example, be separately tracked with the service monitor and other agents and server functions to produce a billing offset that allows

categorization and mediation of different billing entities (accounts) provides the capability for the service provider to individually account for the costs of each ambient service element. For example, this allows for business models in which the free access to the end user can be paid for or partially paid for by one or more service provider partners who are billed for service access using the bill by account capabilities (e.g., the transaction partners can pay for user access to their transaction experience and perhaps pay a revenue share for transaction billing, the advertising sponsored website partners pay for their access service share).

[0016] While the service control capabilities of the service processor and the bill by account service cost sharing and transaction revenue sharing in some cases can create a profitable ambient business model, in other cases, the ambient services can be a potential source of losses for the service provider. Accordingly, in some embodiments, the ambient service capabilities can be modified over time to reduce service cost to the service provider or VSP based on a variety of decision factors. For example, the user can have one level of traffic control for a period of time, and if the user has not signed up for service by the end of the period, the ambient service access is reduced by changing the service control policy settings in the service processor, and the service level can be further reduced over time if the user continues to not sign up for service or the user does not create much transaction revenue. As another example, various recursive throttling algorithms can be utilized to one or more of the service activities offered in ambient service mode so that the user experiences what full speed service is like, and if the user continues consuming appreciable bandwidth with the service activity, then the activity is throttled back to reduce costs. In these examples, the service processor or service controller can issue the user a notification explaining that their service is currently free so their usage is being throttled, and if they desire to receive better service, service plan upgrade offers can be delivered to the user interface (UI). It will now be apparent to one of ordinary skill in the art that the various ambient service parameters including various provisioning and activation processes used to provide an ambient service, can also be managed by various virtual service provider (VSP) apparatus and processes. For example, this allows the same service controllers and service processor solutions to be used to define a wide range of ambient experiences for various device groups or user groups that are controlled by different VSPs.

[0017] Similarly, rather than controlling ambient service profile settings using the VSP functions to control the service controller, service processor, provisioning and activation settings, other embodiments call for the ambient service profile settings to be controlled by various network based service activity control equipment as similarly discussed herein and/or by various intermediate networking devices. Depending on the level of service control and service monitoring sophistication (e.g., advanced DPI or service aware techniques), some, much, most or all of the above described ambient services functionality can be implemented using network based service controls and various VSP management and control techniques. Similarly, in some embodiments, service processor, provisioning and activation settings, and the ambient service profile settings can also be (at least in part) controlled by various intermediate networking devices.

[0018] Providing an ambient service profile for an ambient service can be very difficult. For example, an ambient service profile for a transaction service provider may include that service provider's domain or web site as an allowed destination. However, there may be inline advertisements provided by ad servers and/or partner sites that should also be included in the set of allowed destinations in the ambient service profile, and these may be dynamic or frequently changing. As another example, an ambient service provider may not want to allow access to sites that typically involve relatively high data usage (e.g., streaming and/or downloading of video content). Moreover, the defined ambient service profile quickly stagnates as various applications and destinations, for example, change over time or on each request/usage (e.g., new applications become available and/or web site content and link changes occur daily if not hourly and/or are dynamically generated using well known web site techniques). Thus, what is needed is an adaptive technique for providing an ambient service.

[0019] Accordingly, in some embodiments, adaptive ambient services using an adaptive ambient service profile are provided. In some embodiments, a flexible and efficient adaptive ambient service is provided using a baseline (e.g., a basic starting point) of an adaptive ambient service profile that includes default or previously defined (e.g., by an ambient service provider, network provider, VSP, or another entity) allowable access and disallowed access for the ambient service, such as to various applications, destinations, sources, traffic control rules,

and/or bill by account rules. In some embodiments, the ambient service profile is an automated and a self-evolving service profile using various techniques, such as those described herein.

[0020] In some embodiments, an adaptive ambient service includes providing an ambient service profile. In some embodiments, the ambient service profile includes ambient service allowed access rules and ambient service disallowed access rules. In some embodiments, the ambient service profile further includes ambient service monitored access rules, in which access to, for example, certain applications or destinations is allowed but is considered suspect or unknown, and thus, such access is monitored (e.g., until that application or destination is reclassified under an ambient service allowed access rule or ambient service disallowed access rule). In some embodiments, the ambient service allowed/disallowed/monitored access rules include IP addresses, domains (e.g., URLs for web sites), or any other unique network destination or application or source identifiers.

[0021] In some embodiments, the ambient service allowed access rules and/or ambient service disallowed access rules are pushed to (e.g., published, at predefined times, during low service usage times or periods of low service usage activities, or upon request) the device or the intermediate device (e.g., any type of networking device capable of communicating with a device and a network, such as a femto cell, or any network communication device that translates the wireless data received from the device to a network, such as an access network) from the network (e.g., an element in the network that securely provides such data, such as a service controller for the ambient service). In some embodiments, the ambient service allowed access rules and/or ambient service disallowed access rules are pulled by (e.g., at predefined times, during low service usage times or periods of low service usage activities, or upon request) the device or the intermediate device from the network (e.g., an element in the network that securely provides such data, such as a service controller for the ambient service).

[0022] In some embodiments, the device or intermediate device includes techniques for automatically adapting the service profile based on ambient service usage and thereby updates the ambient service allowed access rules, the ambient service monitored access rules, and/or ambient service disallowed access rules locally. The device or intermediate device can then periodically provide the updated ambient service allowed access rules, ambient service

monitored access rules, and/or ambient service disallowed access rules with the network using various network communication techniques, such as those described above. In some embodiments, the device periodically synchronizes its locally stored ambient service allowed access rules, ambient service monitored access rules, and/or ambient service disallowed access rules with the network using various network communication techniques, such as those described above.

[0023] In some embodiments, various techniques are used for providing the adaptive ambient service. Generally, in some embodiments, a requested use of the ambient service is analyzed to determine its association with the ambient service. In some embodiments, service usage traffic patterns are analyzed. In some embodiments, the requested use of the ambient service is determined to be associated or within the ambient service by querying the ambient service. In some embodiments, the requested used of the service is analyzed by testing the requested application, destination, or source. Each of these various techniques are discussed in greater detail below.

[0024] **Figure 1** illustrates a wireless network architecture for providing adaptive ambient service in accordance with some embodiments. As shown, Figure 1 includes a 4G/3G/2G wireless network operated by, for example, a central provider. As shown, various wireless devices 100 are in communication with base stations 125 for wireless network communication with the wireless network, and other devices 100 are in communication with Wi-Fi Access Points (APs) or Mesh 702 for wireless communication to Wi-Fi Access CPE 704 in communication with central provider access network 109. In some embodiments, each of the wireless devices 100 includes a service processor 115 (as shown), and each service processor connects through a secure control plane link to a service controller 122. In some embodiments, the network based service usage information (e.g., CDRs) is obtained from one or more network elements. As shown, an MVNO core network 210 also includes a CDR storage, aggregation, mediation, feed 118, a MVNO billing interface 122, and a MVNO billing system 123 (and other network elements as shown in Figure 1). Those of ordinary skill in the art will appreciate that various other network architectures can be used for providing adaptive ambient services, and Figure 1 is illustrative of just one such example network architecture for which the adaptive ambient service techniques described herein.

[0025] In some embodiments, the various techniques for adaptive ambient services are performed on the device (e.g., device 100) and/or on an intermediate device (e.g., using a service processor 115 and an ambient service profile). For example, the various techniques for adaptive ambient services can be performed on a processor of the device, and the ambient service profile can be securely stored locally on the device using various techniques for secure execution and storage.

[0026] In some embodiments, the various techniques for adaptive ambient services are performed on the device or on the intermediate device with assistance or verification from the network (e.g., a service controller 122 executed on any network element, in which the service controller 122 is in secure communication with the device/intermediate device, including the service processor 115 executed on the device/intermediate device). In some embodiments, adaptive ambient services are performed on the device or on the intermediate device with assistance or verification from the network (e.g., using a service controller for maintaining a centralized set of ambient service allowed access rules and/or ambient service disallowed access rules, and a superset of all ambient service monitored access rules, working cross device population). In some embodiments, the service controller 122 or other network element(s) assist the device for implementing these techniques for adaptive ambient services (e.g., cross device, cross URL/domain usage patterns/monitoring, publishing centralized set of ambient service allowed access rules, ambient service monitored access rules, and/or ambient service disallowed access rules, including, for example, compromised and/or hacked URLs). In some embodiments, the service controller 122 or other network element(s) assist the device for implementing these techniques for adaptive ambient services by verifying the device maintained set of ambient service allowed access rules, ambient service monitored access rules, and/or ambient service disallowed access rules. In some embodiments, the service controller 122 or other network element(s) assist the device for implementing these techniques for adaptive ambient services by verifying the device monitored service usage with CDR service usage using various techniques, for example, such as those described herein. In some embodiments, the service controller 122 or other network element(s) assist the device for implementing these techniques for adaptive ambient services by verifying the device monitored service usage by IP address (e.g., using CDR by traffic destination).

[0027] In some embodiments the various techniques for adaptive ambient services are performed on the network (e.g., a gateway, router or any other network element using, for example, deep packet inspection (DPI) on the monitored (non-encrypted) network traffic).

[0028] As shown in Figure 1, a CDR storage, aggregation, mediation, feed 118 (e.g., service usage 118, including a billing aggregation data store and rules engine) is a functional descriptor for, in some embodiments, a device/network level service usage information collection, aggregation, mediation, and reporting function located in one or more of the networking equipment boxes attached to one or more of the sub-networks shown in Figure 1 (e.g., central provider access network 109 and/or central provider core network 110), which is in communication with the service controller 122, and a central billing interface 127. As shown in Figure 1, service usage 118 is shown as a function in communication with the central provider core network 110 n. In some embodiments, the CDR storage, aggregation, mediation, feed 118 function is located elsewhere in the network or partially located in elsewhere or integrated with/as part of other network elements. In some embodiments, CDR storage, aggregation, mediation, feed 118 functionality is located or partially located in the AAA server 121 and/or the mobile wireless center/Home Location Register(HLR) 132 (as shown, in communication with a DNS/DHCP server 126). In some embodiments, service usage 118 functionality is located or partially located in the base station, base station controller and/or base station aggregator, collectively referred to as base station 125 in Figure 1. In some embodiments, CDR storage, aggregation, mediation, feed 118 functionality is located or partially located in a networking component in the central provider access network 109, a networking component in the core network 110, the central billing system 123, the central billing interface 127, and/or in another network component or function. This discussion on the possible locations for the network based and device based service usage information collection, aggregation, mediation, and reporting function (e.g., CDR storage, aggregation, mediation, feed 118) can be easily generalized as described herein and as shown in the other figures described herein by one of ordinary skill in the art. Also as shown in Figure 1, the service controller 122 is in communication with the central billing interface 123 (also sometimes referred to as the external billing management interface or billing communication interface) 127, which is in communication with the central billing system 123. As shown, an order management 180 and subscriber management 182 are

also in communication with the central provider core network 110 for facilitating order and subscriber management of services for the devices 100 in accordance with some embodiments.

[0029] In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) provides a device/network level service usage information collection, aggregation, mediation, and reporting function. In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) collects device generated usage information for one or more devices on the wireless network (e.g., devices 100); and provides the device generated usage information in a syntax and a communication protocol that can be used by the wireless network to augment or replace network generated usage information for the one or more devices on the wireless network. In some embodiments, the syntax is a charging data record (CDR), and the communication protocol is selected from one or more of the following: 3GPP, 3GPP2, or other communication protocols. In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) includes a service usage data store (e.g., a billing aggregator) and a rules engine for aggregating the collected device generated usage information. In some embodiments, the syntax is a charging data record (CDR), and the network device is a CDR feed aggregator, and the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) also aggregates CDRs for the one or more devices on the wireless network; applies a set of rules to the aggregated CDRs using a rules engine (e.g., bill by account, transactional billing, and/or any other billing or other rules for service usage information collection, aggregation, mediation, and reporting), and communicates a new set of CDRs for the one or more devices on the wireless network to a billing interface or a billing system (e.g., providing a CDR with a billing offset by account/service). In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) communicates a new set of CDRs for the one or more devices on the wireless network to a billing interface or a billing system. In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) communicates with a service controller to collect the device generated usage information for the one or more devices on the wireless network. In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations

of network elements) communicates with a service controller, in which the service controller is in communication with a billing interface or a billing system. In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) communicates the device generated usage information to a billing interface or a billing system. In some embodiments, the CDR storage, aggregation, mediation, feed (and/or other network elements or combinations of network elements) communicates with a transport gateway and/or a Radio Access Network (RAN) gateway to collect the network generated usage information for the one or more devices on the wireless network. In some embodiments, the service controller 122 communicates the device generated service usage information to the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements).

[0030] In some embodiments, the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) performs rules for performing a bill by account aggregation and mediation function. In some embodiments, the service controller 122 in communication with the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) performs a rules engine for aggregating and mediating the device generated usage information. In some embodiments, a rules engine device in communication with the CDR storage, aggregation, mediation, feed 118 (and/or other network elements or combinations of network elements) performs a rules engine for aggregating and mediating the device generated usage information.

[0031] In some embodiments, the rules engine is included in (e.g., integrated with/part of) the CDR storage, aggregation, mediation, feed 118. In some embodiments, the rules engine and associated functions, as discussed herein, is a separate function/device. In some embodiments, the service controller 122 performs some or all of these rules engine based functions, as discussed herein, and communicates with the central billing interface 127. In some embodiments, the service controller 122 performs some or all of these rules engine based functions, as discussed herein, and communicates with the central billing system 123.

[0032] In some embodiments, duplicate CDRs are sent from the network equipment to the billing system 123 that is used for generating service billing. In some embodiments,

duplicate CDRs are filtered to send only those CDRs/records for devices controlled by the service controller and/or service processor (e.g., the managed devices). For example, this approach can provide for the same level of reporting, lower level of reporting, and/or higher level of reporting as compared to the reporting required by the central billing system 123.

[0033] In some embodiments, a bill-by-account billing offset is provided. For example, bill-by-account billing offset information can be informed to the central billing system 123 by providing a CDR aggregator feed that aggregates the device based service usage data feed to provide a new set of CDRs for the managed devices to the central billing interface 127 and/or the central billing system 123. In some embodiments, transaction billing is provided using similar techniques. For example, transaction billing log information can be provided to the central billing interface 127 and/or the central billing system 123.

[0034] In some embodiments, the rules engine (e.g., performed by the service usage 118 or another network element, as discussed herein) provides a bill-by-account billing offset. For example, device generated usage information (e.g., charging data records (CDRs)) includes a transaction type field (e.g., indicating a type of service for the associated service usage information). The rules engine can apply a rule or a set of rules based on the identified service associated with the device generated usage information to determine a bill-by-account billing offset (e.g., a new CDR can be generated to provide the determined bill-by-account billing offset). In some examples, the determined bill-by-account billing offset can be provided as a credit to the user's service usage account (e.g., a new CDR can be generated with a negative offset for the user's service usage account, such as for network chatter service usage, or transactional service usage, or for any other purposes based on one or more rules performed by the rules engine).

[0035] As another example, for a transactional service, a first new CDR can be generated with a negative offset for the user's service usage account for that transactional service related usage, and a second new CDR can be generated with a positive service usage value to charge that same service usage to the transactional service provider (e.g., Amazon, eBay, or another transactional service provider). In some embodiments, the service controller 122 generates these two new CDRs, and the service usage 118 stores, aggregates, and communicates these two new

CDRs to the central billing interface 127. In some embodiments, the service controller 122 generates these two new CDRs, and the service usage 118 stores, aggregates, and communicates these two new CDRs to the central billing interface 127, in which the central billing interface 127 applies rules (e.g., performs the rules engine for determining the bill-by-account billing offset).

[0036] In some embodiments, the service controller 122 sends the device generated CDRs to the rules engine (e.g., service usage 118), and the rules engine applies one or more rules, such as those described herein and/or any other billing/service usage related rules as would be apparent to one of ordinary skill in the art. In some embodiments, the service controller 122 generates CDRs similar to other network elements, and the rules (e.g., bill-by-account) are performed in the central billing interface 127. For example, for the service controller 122 to generate CDRs similar to other network elements, in some embodiments, the service controller 122 is provisioned on the wireless network and behaves substantially similar to other CDR generators on the network) as would be apparent to one of ordinary skill in the art.

[0037] In some embodiments, the service controller 122 is provisioned as a new type of networking function that is recognized as a valid and secure source for CDRs by the other necessary elements in the network (e.g., the Service Usage History/ CDR Aggregation and Mediation Server 118). In some embodiments, where the network necessary apparatus will only recognize CDRs from certain types of networking equipment (e.g. RAN Gateway 410 or Transport Gateway 420), then the Service Controller 122 can provide authentication credentials to the other networking equipment that indicate it is one of the approved types of equipment. In some embodiments, the link between the Service Controller 122 and the necessary CDR aggregation and mediation equipment is secured, authenticated, encrypted and/or signed.

[0038] In some embodiments, the CDR storage, aggregation, mediation, feed 118 discards the network based service usage information (e.g., network based CDRs) received from one or more network elements. In these embodiments, the service controller 122 can provide the device based service usage information (e.g., device based CDRs) to the CDR storage, aggregation, mediation, feed 118 (e.g., the CDR storage, aggregation, mediation, feed 118 can just provide a store, aggregate, and communication function(s)), and the device based service

usage information is provided to the central billing interface 127 or the central billing system 123.

[0039] In some embodiments, the device based CDRs and/or new CDRs generated based on execution of a rules engine as described herein is provided only for devices that are managed and/or based on device group, service plan, or any other criteria, categorization, and/or grouping, such as based on ambient service or ambient service provider.

[0040] **Figure 2** illustrates a wireless network architecture for providing adaptive ambient service including a proxy server in accordance with some embodiments. As shown, Figure 2 includes a proxy server 270 in communication with a 4G/3G/2G wireless network operated by, for example, a central provider. In some embodiments, each of the wireless devices 100 includes a service processor 115 (as shown), and each service processor connects through a secure control plane link to a service controller 122. In some embodiments, the network based service usage information (e.g., CDRs) is obtained from Radio Access Network (RAN) gateway(s) 410 and/or transport gateway(s) 420.

[0041] Referring now to the 4G/3G/2G access network as shown in Figure 2, the 4G/3G and 3G/2G base stations/nodes 125 are in communication with a 4G/3G/2G Radio Access Network (RAN) gateway 410 via a radio access network 405, which are in communication with a 4G/3G/2G transport gateway 420 via an access transport network 415. The central provider core network 110 is in network communication with the access transport network 415 (e.g., via a dedicated/leased line, and as shown, via a firewall 124). The Internet 120 is available via a firewall 124 and the transport gateway(s) 420, as shown. Also, as shown, a network apparatus provisioning system 160, order management 180, and subscriber management 182 are in communication with the central provider core network 110. As shown, a AAA server 121, a mobile wireless center/Home Location Register(HLR) 132, a DNS/DHCP 126, and CDR storage, aggregation, mediation, feed 118 are also in communication with the access transport network 415. The central billing system 123 and the central billing interface 127 are shown in communication with the central provider core network 110.

[0042] In some embodiments, the various techniques for adaptive ambient services are performed using the proxy server 270. For example, the ambient service provider can provide

the proxy server 270, and the ambient service provider monitors, accounts, controls, and/or optimizes the service usage through the proxy server 270 (e.g., using the adaptive ambient service profile and/or any of the techniques described herein). In some embodiments, the central service provider provides the proxy server 270, and the ambient service provider is provided access to monitor, account, control, and/or optimize the service usage through the proxy server 270 (e.g., using the adaptive ambient service profile and/or any of the techniques described herein).

[0043] **Figure 3** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments. At 302, the process for an adaptive ambient service begins. At 304, whether a requested access is within the ambient service profile, such as within the ambient service allowed access rules, the ambient service monitored access rules, and/or ambient service disallowed access rules, is determined. At 306, if the requested access is within the ambient service profile, then the appropriate rule is applied, such as the appropriate ambient service allowed access rule, ambient service monitored access rule, and/or ambient service disallowed access rule. At 308, if not (e.g., the requested access is not within the ambient service profile, such as not categorized within any of the ambient service profile rules), then categorize the requested access as a monitored access. In some embodiments, a requested access that is not otherwise known or categorized in the ambient service profile, is allowed and then monitored (e.g., trusted and then verified through monitoring and other techniques, such as the various other techniques described herein). At 310, if the requested access is categorized as monitored access, then allow the requested access and monitor the requested access. At 312, determine whether the requested access can now be added or blocked based on the monitored access. At 314, if the requested access can now be blocked, then block the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service blocked access rules). Similarly, if the requested access can now be added, then continue to allow the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service allowed access rules). At 316, determine whether to continue to monitor the requested access (e.g., if the requested access is still in progress, and the requested access has not been otherwise categorized as allowed or blocked ambient service access, then continue to monitor), and if so, continue to monitor the requested access at 318. At 320, the process is repeated for the next requested access. At 322, the process is completed.

[0044] **Figure 4** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments. At 402, the process for an adaptive ambient service begins. At 404, whether a requested access is associated with the ambient service is determined. As discussed herein with respect to Figure 4, there are various techniques for testing the association of the requested access with the ambient service. For example, at 406, whether the requested access is within the ambient service profile, such as within the ambient service allowed access rules, the ambient service monitored access rules, and/or ambient service disallowed access rules, is determined. At 408, whether the requested access to an application is tested to determine whether the application is associated with the ambient service and whether the application is currently executing. At 410, whether the requested access is within the same traffic flow as other ambient services traffic is determined (e.g., using various device based, device assisted and/or network based (such as using DPI) traffic monitoring techniques). Various other techniques can also be employed for testing the association of the requested access with the ambient service. For example, incoming traffic can be tagged (e.g., using a referred URL or an HREF or an IMAGE HTML tag); and/or the domain object management (DOM) tree can be analyzed to determine a links model of a requested web page or other techniques can be utilized to determine the links model of the requested web page. As another example, the content of the requested access (e.g., web page content) can be analyzed to determine if it is associated with the ambient service (e.g., using various content relevancy techniques). As another example, a reverse lookup to the requested network destination (e.g., URL, associated domain, sub-domain, ad server domain, or other destination or source) can be determined to test the association of the requested access with the ambient service. At 412, based on the above testing of the association of the requested access with the ambient service, determine whether the requested access can now be added or blocked based on the monitored access. At 414, if the requested access can now be blocked, then block the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service blocked access rules). Similarly, if the requested access can now be added, then continue to allow the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service allowed access rules). At 416, determine whether to continue to test the association of the requested access with the ambient service (e.g., if the requested access is still in progress, and the requested access has not been otherwise categorized as allowed or blocked

ambient service access, then continue to perform the testing analysis), and if so, continue to perform the testing analysis of the requested access at 418. At 420, the process is repeated for the next requested access. At 422, the process is completed.

[0045] **Figure 5** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments. At 502, the process for an adaptive ambient service begins. At 504, traffic patterns of ambient service usage are analyzed. As discussed herein with respect to Figure 5, there are various techniques for testing and analyzing the ambient service usage traffic patterns to determine whether the access should be allowed, blocked, or is otherwise deemed suspicious or otherwise not known/categorized, and thus, should be monitored. For example, at 506, expected ambient service usage is compared with the actual ambient service usage (e.g., using various ambient service usage monitoring techniques, as described herein and/or using other techniques). In some embodiments, the expected versus actual ambient service usage is analyzed and can be further categorized as described below. At 508, the ambient service traffic usage is analyzed and categorized. In some embodiments, the ambient service traffic usage is categorized by total traffic, by application, by destination (e.g., URL, domain, sub-domain, or other unique identifier), by traffic flow, by network socket, by time of day, by ambient service profile categorization (e.g., ambient service allowed access, ambient service monitored access, and/or ambient service blocked/disallowed access rules), by web browsing traffic patterns, by content download patterns, and/or using any other categorizations or patterns. In some embodiments, the ambient service traffic usage is aggregated (e.g., across user or user group), and statistical analysis techniques are used to identify categories of allowable or suspect or should be disallowed access service usage requests/patterns (e.g., very infrequently requested access for high data bandwidth ambient service usage may be deemed suspect or automatically categorized as disallowed). At 510, the ambient service traffic usage is correlated with various ambient traffic profiles. For example, buying patterns can be correlated with content download patterns (e.g., a power use categorization versus a seldom/never purchases user categorization can be used to provide different ambient service profiles and/or throttling techniques based on such categorizations for the various ambient service users).

[0046] Various other techniques can also be employed for testing the ambient service usage traffic to provide adaptive ambient services as will now be appreciated by one of ordinary

skill in the art in view of the embodiments and examples described herein. At 512, based on the above testing of the association of the requested access with the ambient service, determine whether the requested access can now be added or blocked based on the monitored access. At 514, if the requested access can now be blocked, then block the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service blocked access rules). Similarly, if the requested access can now be added, then continue to allow the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service allowed access rules). At 516, determine whether to continue to test the association of the requested access with the ambient service (e.g., if the requested access is still in progress, and the requested access has not been otherwise categorized as allowed or blocked ambient service access, then continue to perform the testing analysis), and if so, continue to perform the testing analysis of the requested access at 518. At 520, the process is repeated for the next requested access. At 522, the process is completed.

[0047] **Figure 6** illustrates a flow diagram for providing adaptive ambient service in accordance with some embodiments. In some embodiments, a combination of various techniques are used for providing adaptive ambient services, such as those described below with respect to Figure 6. In some embodiments, a subset of these various techniques are employed using various combinations of such techniques or individual techniques. At 602, the process for an adaptive ambient service begins. At 604, whether a requested access is associated with the ambient service is determined (e.g., as similarly described above with respect to Figure 4). At 606, the ambient service usage is analyzed (e.g., as similarly described above with respect to Figure 5). At 608, the ambient service is queried to verify the requested access (e.g., if the requested access is not in the ambient service profile or otherwise suspicious or covered by a monitored access rule, then the ambient service can be queried for more information as to whether this requested access is associated with the ambient service usage or should otherwise be allowed). In some embodiments, various requested accesses can be allowed for certain users or for certain requests to allow for monitoring or testing but denied for other users/requests. In some embodiments, the device or intermediate device based ambient service profile settings (e.g., local ambient service profile rules, categorizations, settings, and/or other data) are provided to the ambient service provider for further analysis and to correlate various access requests with the ambient service (e.g., monitored access requests can be confirmed as approved or not, that is

associated with the ambient service or otherwise permissible, or not, as deemed by the ambient service provider using various techniques). At 610, the source of the requested access is analyzed. In some embodiments, the source of the requested access is itself tested using various techniques (e.g., search engine/web crawler techniques or DOM techniques to determine whether certain web based requests are associated with the ambient service; or to verify with a secondary source such as an ad server; or to verify ownership of certain network domains by the ambient service provider or associated advertiser).

[0048] Various other techniques can also be employed for providing adaptive ambient services as will now be appreciated by one of ordinary skill in the art in view of the embodiments and examples described herein. At 612, based on the above testing of the association of the requested access with the ambient service, determine whether the requested access can now be added or blocked based on the monitored access. At 614, if the requested access can now be blocked, then block the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service blocked access rules). Similarly, if the requested access can now be added, then continue to allow the requested access and update the ambient service profile accordingly (e.g., add the requested access to the ambient service allowed access rules). At 616, determine whether to continue to test the association of the requested access with the ambient service (e.g., if the requested access is still in progress, and the requested access has not been otherwise categorized as allowed or blocked ambient service access, then continue to perform the testing analysis), and if so, continue to perform the testing analysis of the requested access at 618. At 620, the process is repeated for the next requested access. At 622, the process is completed.

[0049] 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.

[0050] WHAT IS CLAIMED IS:

CLAIMS

1. A system, comprising:
a processor of a communications device configured to:
 implement an ambient service profile for assisting control of the communications
5 device use of an ambient service on a network, wherein the ambient service profile
 includes a plurality of service policy settings, and wherein the ambient service profile is
 associated with an ambient service plan that provides for initial access to the ambient
 service with limited service capabilities prior to activation of a new service plan;
 monitor use of the first service based on the ambient service profile; and
10 adapt the ambient service profile based on ambient service usage;
a memory of the communications device coupled to the processor and configured to
provide the processor with instructions.
2. The system recited in claim 1, wherein the ambient service plan allows for access to the
ambient service with limited service capabilities that are limited based on one or more of the
15 following: period of time, network address, service type, content type, application type,
bandwidth, and data usage.
3. The system recited in claim 1, wherein the ambient service plan is a low cost or free trial
service plan that is bundled or provided as an option for purchase at a point of sale of the
communications device.
- 20 4. The system recited in claim 1, wherein the communications device is activated prior to a
point of sale of the communications device, and the ambient service plan is associated with the
communications device during activation.
5. The system recited in claim 1, wherein the ambient service plan is associated with the
communications device during one or more of the following: a manufacture of the
25 communications device, a distribution of the communications device, or a point of sale of the
communications device.
6. The system recited in claim 1, wherein the ambient service plan includes an option to
purchase a new service plan for the communications device, wherein the new service plan
includes additional service capabilities.

7. The system recited in claim 1, wherein the ambient service profile is programmable by one or more of the following: a manufacturer, a service provider, a distributor, a virtual service provider, and a device manager.

8. The system recited in claim 1, wherein the ambient service is a transaction based service, wherein service usage for the ambient service by the communications device is not billed, and wherein electronic commerce based transactions performed using the communications device are billed as transaction based charges.

9. The system recited in claim 1, wherein the ambient service is a transaction based service, wherein electronic commerce based transactions performed using the communications device are billed as transaction based charges, and wherein a portion or all of service usage costs are billed to one or more of the following: an advertiser, a transaction provider, a mobile virtual network operator, a virtual service provider, and an ambient service provider.

10. The system recited in claim 1, wherein the communications device is a mobile communications device, and the first service includes one or more Internet based services.

11. The system recited in claim 1, wherein the communications device is a mobile communications device, and the first service includes one or more Internet based services, and wherein 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 netbook, and a home networking system.

12. The system recited in claim 1, wherein the communications device includes a modem, and the processor is located in the modem.

13. The system recited in claim 1, wherein the first service policy includes one or more of the following: access control settings, traffic control settings, billing system settings, user notification with acknowledgement settings, user notification with synchronized service usage information, user privacy settings, user preference settings, authentication settings, admission control settings, application access settings, content access settings, transaction settings, and network or device management communication settings.

14. The system recited in claim 1, wherein the implementation of the first service profile is verified based on one or more of the following: device based service usage information and network based service usage information.

15. The system recited in claim 1, wherein the processor of the communications device is further configured to:

determine whether a requested access should be allowed based on the ambient service profile;

determine whether a requested access should be blocked based on the ambient service profile; and

determine whether a requested access should be allowed and monitored based on the ambient service profile.

16. The system recited in claim 1, wherein the processor of the communications device is further configured to:

modify the ambient service profile based on updates received from the network.

17. The system recited in claim 1, wherein the processor of the communications device is further configured to:

monitor a requested access based on the ambient service profile; and

adapt the ambient service profile based on the monitored access, wherein the ambient service profile includes a set of ambient service allow access, ambient service monitor access, and ambient service block access rules.

18. The system recited in claim 1, wherein the processor of the communications device is further configured to:

monitor a requested access based on the ambient service profile using one or more of the following techniques: determine whether the requested access is associated with the ambient service, analyze ambient service usage, query the ambient service to verify the requested access, and test the source of the requested access; and

adapt the ambient service profile based on the monitored access, wherein the ambient service profile includes a set of ambient service allow access, ambient service monitor access, and ambient service block access rules.

19. A method, comprising:

implementing an ambient service profile for assisting control of the communications device use of an ambient service on a network, wherein the ambient service profile includes a plurality of service policy settings, and wherein the ambient service profile is associated with an ambient service plan that provides for initial access to the ambient service with limited service capabilities prior to activation of a new service plan;

monitoring use of the first service based on the ambient service profile; and
adapting the ambient service profile based on ambient service usage.

20. A computer program product, the computer program product being embodied in a computer readable storage medium and comprising computer instructions for:

implementing an ambient service profile for assisting control of the communications device use of an ambient service on a network, wherein the ambient service profile includes a plurality of service policy settings, and wherein the ambient service profile is associated with an ambient service plan that provides for initial access to the ambient service with limited service capabilities prior to activation of a new service plan;

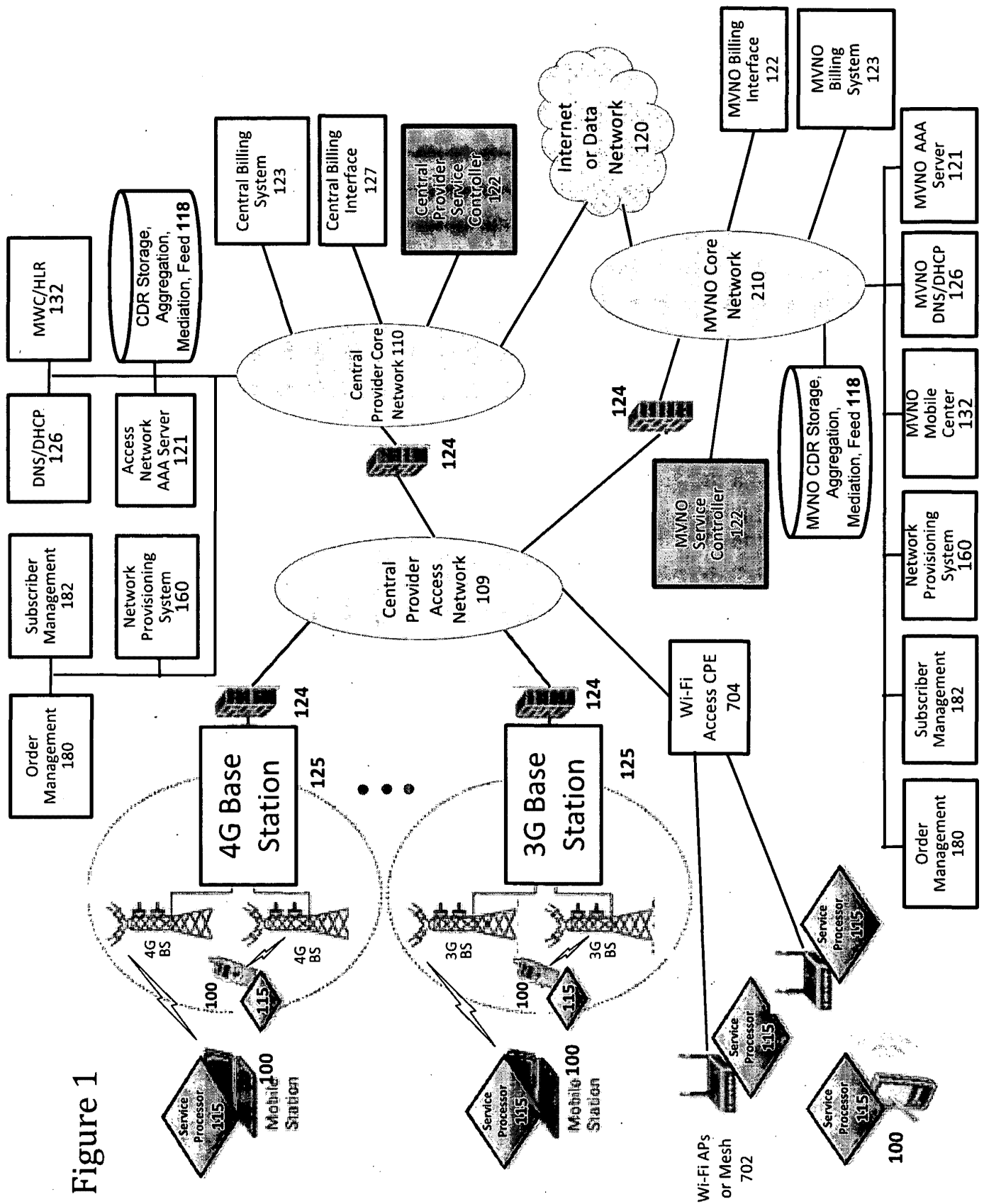
monitoring use of the first service based on the ambient service profile; and
adapting the ambient service profile based on ambient service usage.

ADAPTIVE AMBIENT SERVICES

ABSTRACT OF THE DISCLOSURE

[0051] Adaptive ambient services are provided. In some embodiments, an adaptive ambient service includes providing an ambient service profile. In some embodiments, an ambient service includes implementing an ambient service profile for assisting control of the communications device use of an ambient service on a network, in which the ambient service profile includes a plurality of service policy settings, and in which the ambient service profile is associated with an ambient service plan that provides for initial access to the ambient service with limited service capabilities prior to activation of a new service plan; monitoring use of the first service based on the ambient service profile; and adapting the ambient service profile based on ambient service usage.

Figure 1



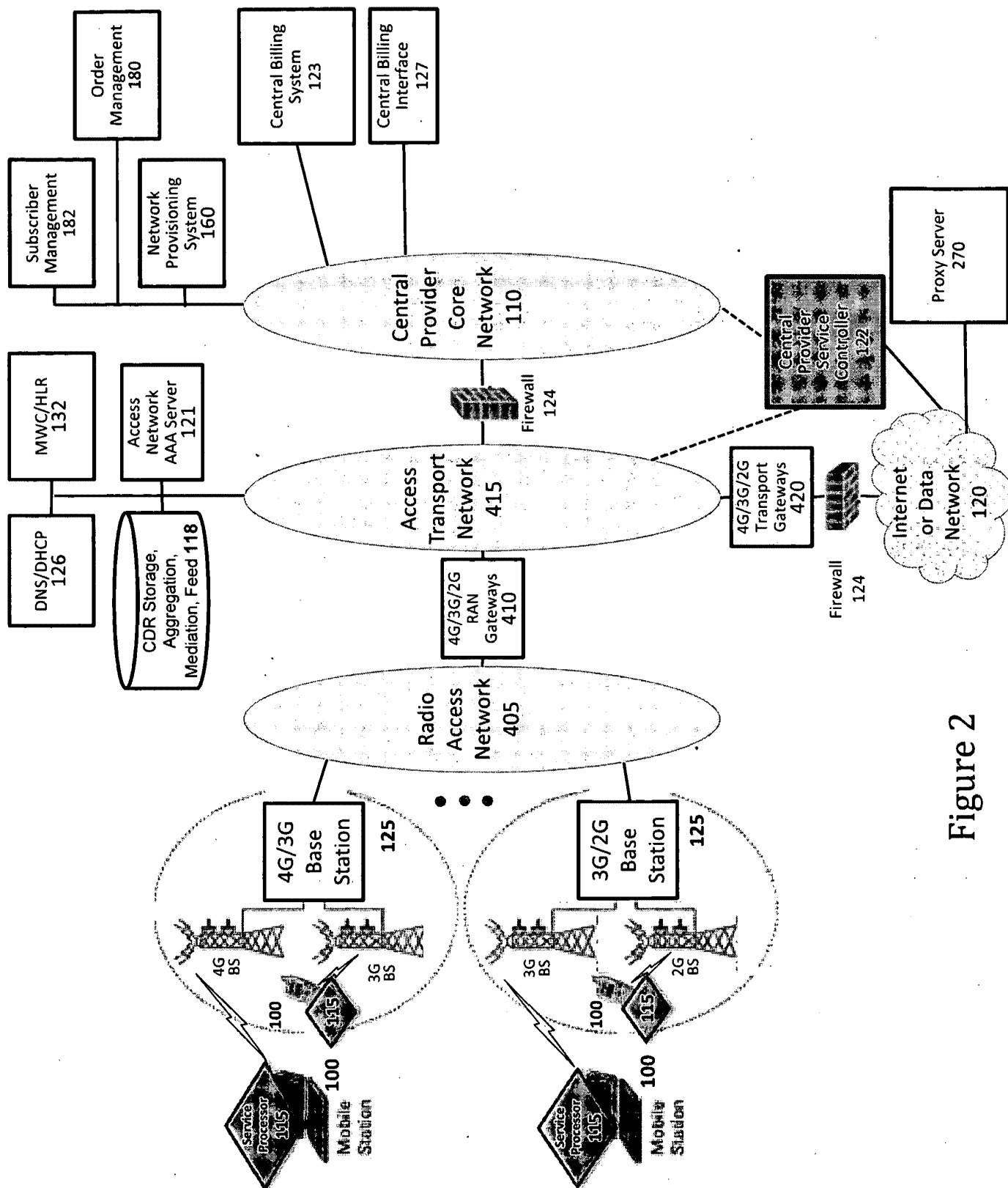


Figure 2

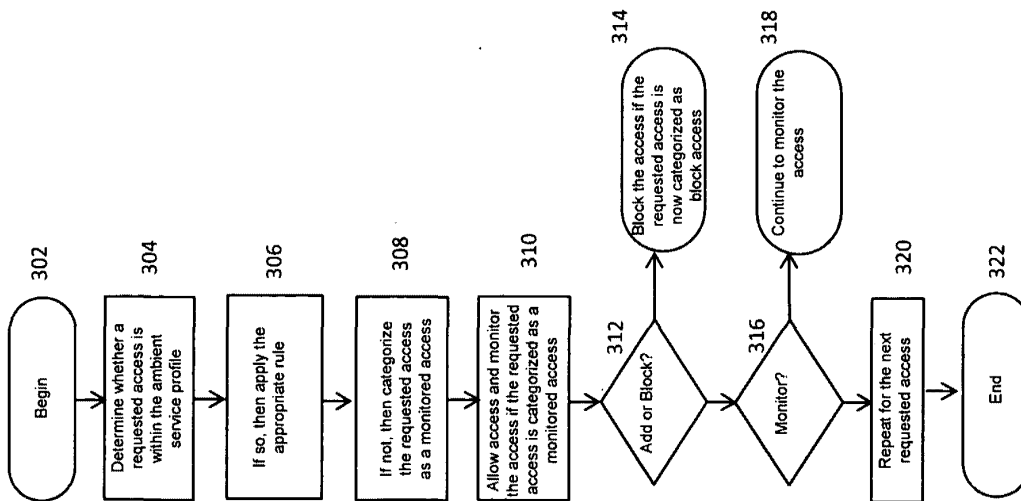


Figure 3

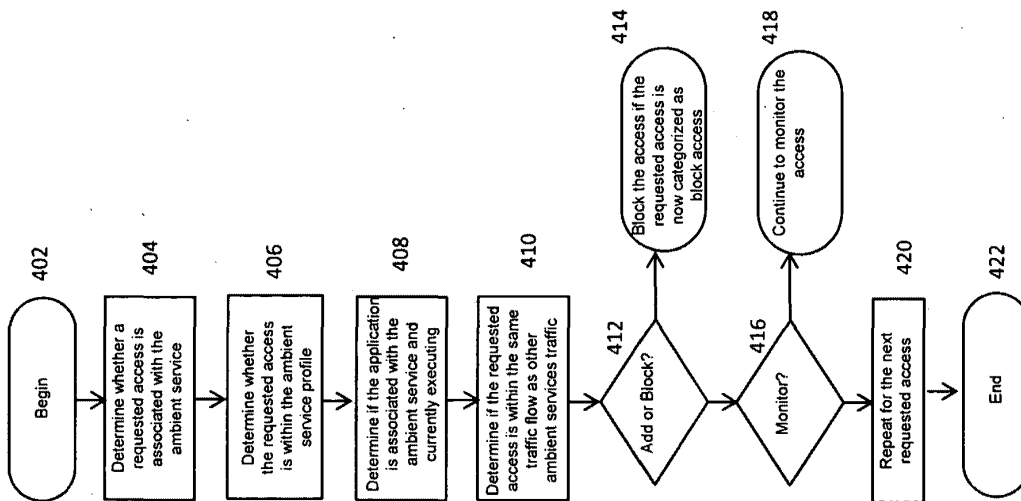


Figure 4

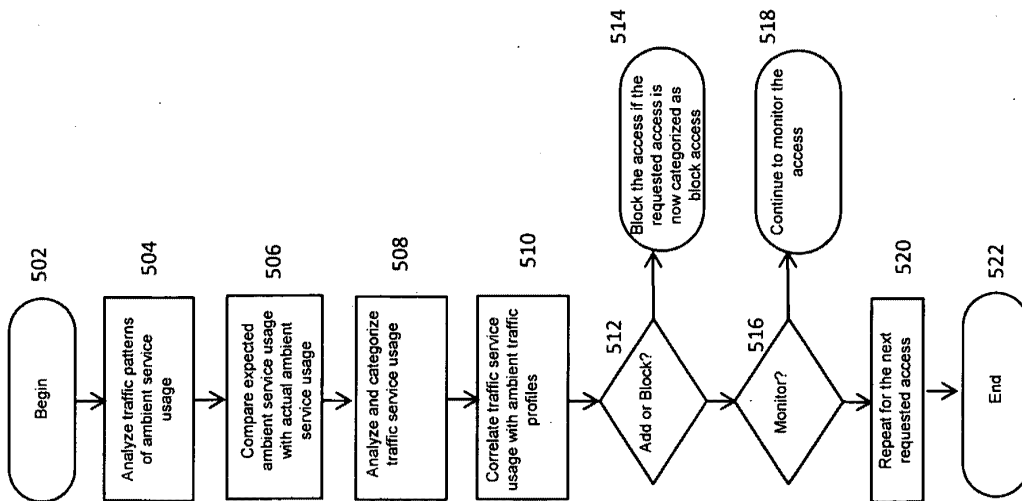


Figure 5

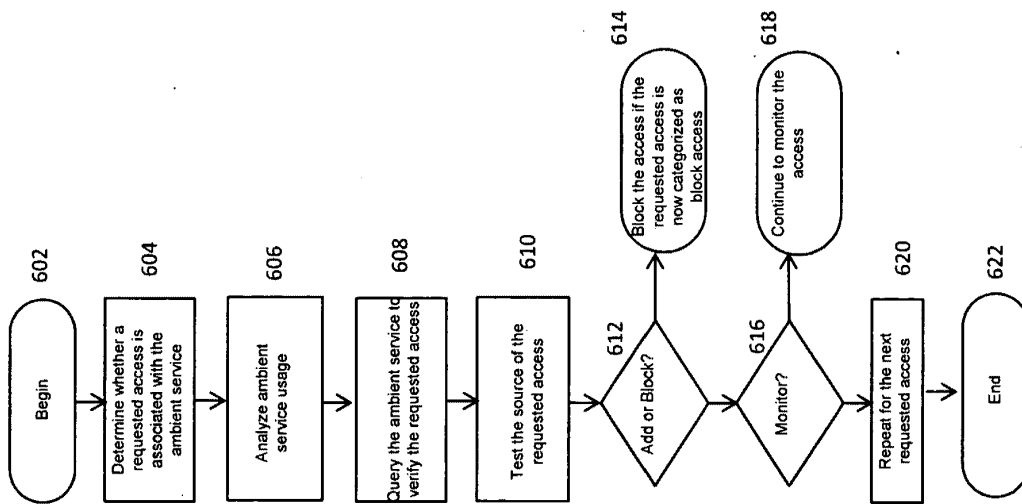


Figure 6

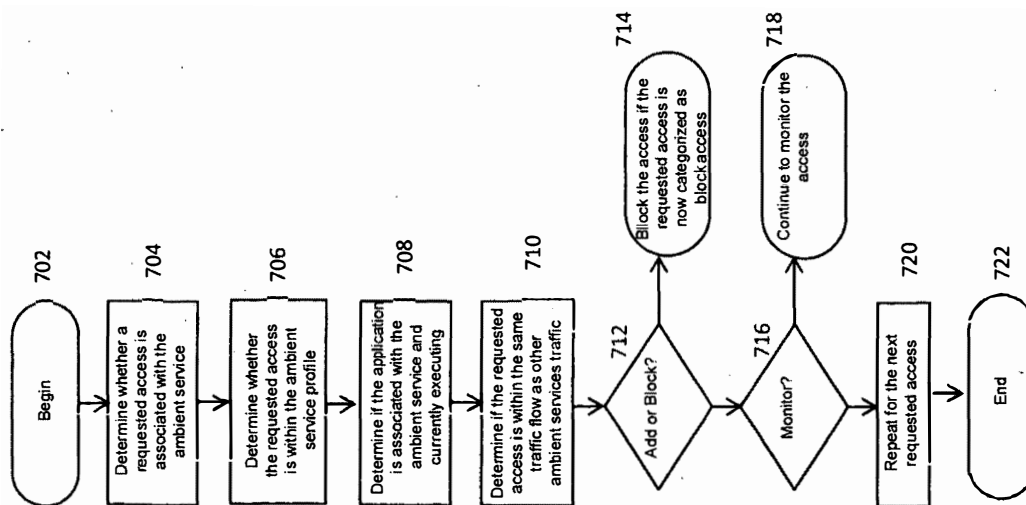


Figure 7

PATENT APPLICATION SERIAL NO. _____

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PATENT AND TRADEMARK OFFICE
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