

Enabling on-demand services and flexible service packages

The combined role of OSS/BSS and policy managers in delivering next generation services

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Telco and cable service providers are clearly engaged in a race to sign up and retain subscribers while keeping average revenue per user (ARPU) prices from falling from the commoditization brought about by a highly competitive market. This climate has resulted in service portfolio diversification along three approaches that are often combined: offering tiered high speed internet (HSI) access bandwidth for different user categories, bundling voice, TV and HSI services into a triple play offering from a single service provider, and offering a multitude of hosted and off-net partner applications to expand beyond traditional services [Figure 1].

The goal is to increase per subscriber revenues and loyalty with personalized and innovative applications that are available at the click of a button. Putting end users in control of their services allows them to instantaneously tailor their service plan by selecting the service mix appropriate to their lifestyle. Subscribers can leverage flexible time-of-day usage rates, benefit from promotional offers and deliver a seamless integration with hosted applications from the service provider itself or their ecosystem partners, without requiring the manual assistance of the service provider's call center operator.

But, the breath and variety of applications that service providers can bundle into an HSI or triple play personalized offering is gated, amongst other factors, by their back office's ability to seamlessly provision and update billing information as requested by the user via its portal without relying on costly and slow human intervention. Take for example a seemingly trivial HSI portal feature that reports current service usage and offers some options once usage has been exceeded. Reporting data service usage with the current mediation billing infrastructure optimized for flat billing is the first challenge. Towering above that is the capability to automatically configure and reconfigure network resources dynamically to support portal redirection, a temporarily reduced bandwidth (until the end of the month), increase a monthly usage quota (top-up), or upgrade to a higher usage service package to reflect those changes to the billing system.

In all, there are a number of aspects that must be considered to support the breadth of new services considered by service providers:

- provisioning must be expanded to include provisioning of all the applications bundled in the subscriber services,
- the infrastructure must cover transient services that require dynamic network re-configuration for the duration of its presence,
- usage-based billing requires service usage collection and dynamic re-configuration or portal redirection once the quota is exceeded

- the capability to dynamically accept or deny on-demand services in real-time based on the current network capacity must be introduced
- the network should dynamically improve the quality of service for those applications offered by the service provider (on-net) versus those offered by third party (off-net)

To overcome these challenges, billing and provisioning systems must be tightly integrated with a policy-based network access and control framework that has the ability to automatically control the network resources based on subscribers or application demands and report those modifications and service usage to billing systems.

Provisioning next generation services

To support the requirement for on-demand services and applications, provisioning must evolve beyond the traditional provisioning of network resources. It must combine static network configuration with the provisioning of the network policy manager and the applications' frameworks. Not only do provisioning systems assign network and home device resources (VLAN, Service Access Point, set-top-box, residential gateway) with default configuration (QOS and ACL) as their traditional role dictates, but they are now required to provision policy management and control functions as well as application middleware with subscriber profile, their service entitlements and select predefined governing policies. Once this initial end-to-end provisioning process is complete, the subscriber's first interaction with the network is controlled by the policy manager who will remove registration portal redirection, allocate IP addresses to subscriber devices, set the appropriate upstream/downstream QOS/ACL corresponding to the overall computed policies required for each of the services selected and start metering the service as directed by the subscriber profile [Figure 2]. This division of labor between provisioning systems and policy control systems results in a simpler provisioning model that can keep up with the scale, dynamics and breadth of new service creation, and even reducing time to market, costs and risks.

Some service modifications such as adding new hardware devices or resources to a subscriber profile or changing the network attachment point when a subscriber moves to a new address will require the involvement of the OSS provisioning systems. However, many on-demand triggers evoked by subscribers, the network or the applications result in dynamic network provisioning by the Alcatel 5750 Subscriber Service Controller (SSC); a policy-based management and control system:

On-demand service admission control. For dynamic applications such as Video-On-Demand (VOD) requiring a sizable amount of bandwidth that is highly variable over time depending on subscriber demand, service providers must implement a control system that will notify capacity planning systems that subscriber demand is crossing some configured capacity thresholds and reject new application sessions under extreme load to ensure that existing sessions do not suffer from network congestion. Another reason for applying service admission control is to allow revenue prioritization across similar services that might be under promotional offers. In IPTV for example, a policy could allocate free VOD a maximum of 30% of the overall available VOD bandwidth. The admission control's knowledge of the total available network capacity in the first, second, third and fourth miles will be used to grant or deny network access to the application.

Home Device Modification Trigger. Each time a home device boots-up, a new policy can be applied to cover cases such as home device replacement, device portability and device spoofing. Using the policy manager to govern these minor subscriber changes simplifies the provisioning process while keeping the network free from fraudulent access.

Usage-Based Trigger. Subscriber usage can be metered and policies applied when certain metering thresholds are exceeded. For example, a user could receive an e-mail notification that its usage has reached 70%. At 100%, the user is redirected to a captive portal to select a top-up for the remainder of the month or continue with best effort service.

Time-Based Trigger. Timer expiry could change the policy based on time-of-day, time based promotional offers or additional bandwidth for an elapsed amount of time (temporary upgrade). In these cases, the network policies would be automatically adjusted to their "normal" settings once the timer has expired.

Application or Network Event Trigger. Applications or network events can contact the policy manager to request that a new policy be implemented. For example, policy managers can implement an immediate QOS bandwidth boost ensuring high quality of experience for on-net or partner applications like online movie previews accessed by subscribers. This scheme can be implemented via DPI (to detect application initialization request) or by having the application request new connectivity parameters from the policy manager. Another common usage of application-driven triggers is to redirect a user to a captive portal should security breaches such as worms, virus or denial of service attacks be reported by deep packet inspection (DPI) systems.

Subscriber Portal Modification Trigger. Having a policy manager controlling the network configuration in real-time allows many service changes triggered via the subscriber portal to be processed without the OSS's intervention. HSI service upgrade from Silver to Gold is an example of a service that a policy manager can automatically provision from a portal request.

Billing for next generation services

In order to complement the flexible service delivery supported by the provisioning and policy managers, billing systems must be brought into the dynamic loop to reflect the flexible service plans and content billing that can now be offered to subscribers. In addition to automatic service modification notification, the Alcatel 5750 SSC policy manager closes the gap by offering a metering and accounting framework that is fully integrated with policy management and multi-vendor DPI functionality to offer both service-based billing and application-based billing.

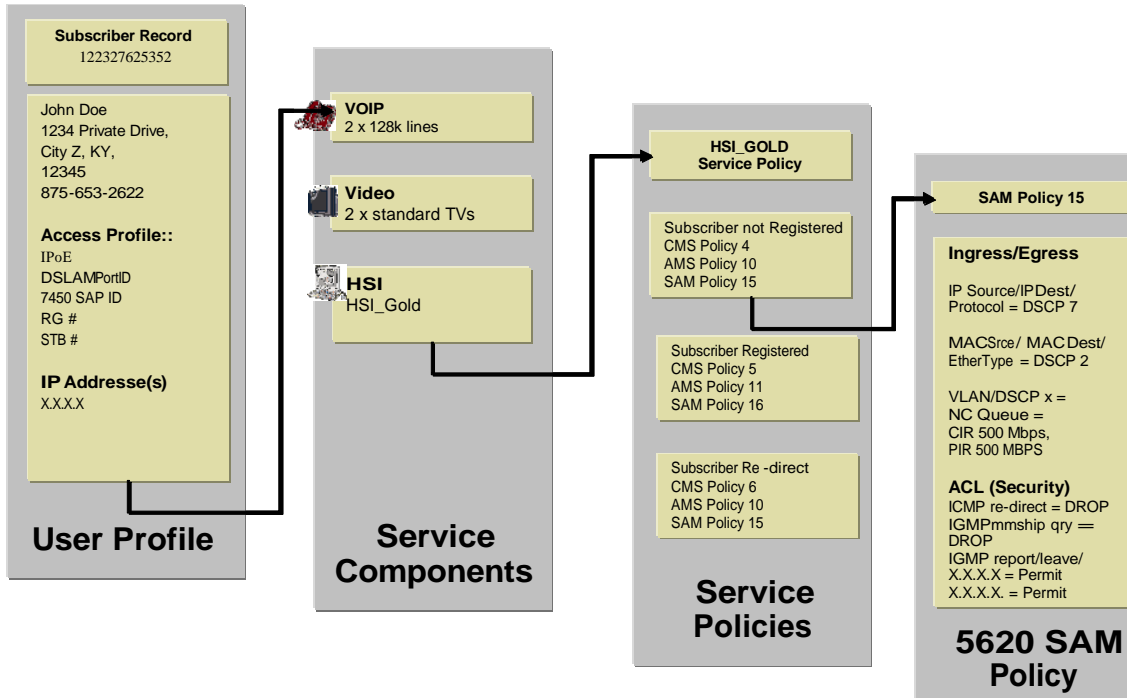
Service-based billing refers to the billing of a service category, such as HSI, according to the amount of traffic generated by the subscriber on that particular service queue. Service access point or application queue statistics are collected at predefined regular intervals by the policy manager and aggregated records exposed to billing systems for reconciliation with prepaid, post-paid or monthly statement roll-up. In addition, by only collecting usage statistics on the queue carrying off-net applications, the policy manager provides the mechanism to avoid double billing subscribers for usage of on-net applications.

Application usage billing goes one level deeper to measure application usage as detected by DPI metering. The policy manager can interact with the DPI engine to set the DPI's policies and receive application usage data collected by the DPI. This infrastructure allows service providers to strike revenue sharing and revenue recognition agreements with content partners to offer applications such as usage-based Peer-to-Peer application (such as Skype) or differentiated movie download with a combination of higher download bandwidth with usage-based billing.

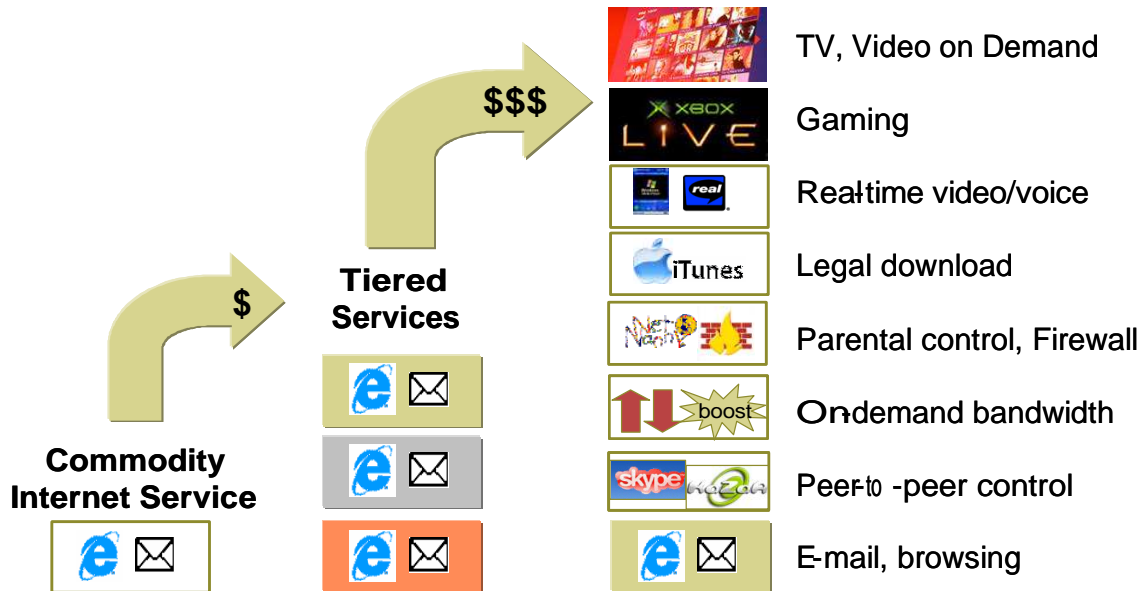
In conclusion, provisioning systems, billing systems and policy managers form the three pillars from which a new, evolved OSS/BSS infrastructure can support on-demand services and flexible service

packaging. Their respective strengths are combined to provide a seamless solution designed to cater to the subscriber's evolving taste for personalized services that fit their lifestyles and budget. The result is a satisfied customer who increasingly relies on the service provider for its service and content needs driving both loyalty and ARPU to new heights.

Figure 1 – Increasing ARPU with tiered HSI, partner applications and bundling



Personalized Service Bundles



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