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Policy Control: Managing the Mobile Broadband Surge

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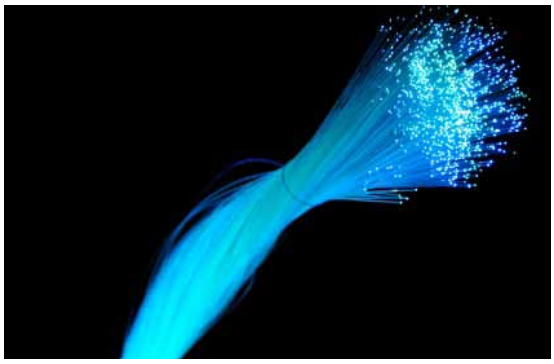

Global mobile data traffic has surpassed voice to become the new king of the mobile industry, and based on projections by industry analysts, there's no slow down in sight. Coda Research predicts a 40-fold increase in the amount of data traffic carried over cellular networks in the next five years. If ABI Research is on the mark, the number of mobile broadband users will surpass 1.5 billion by 2015.

Carriers around the world are reporting large increases in revenue from data services, driven in large part by mobile internet access using smartphones, netbooks and tablet PCs. At airports, in coffee shops, in automobiles and home offices, millions of untethered devices are connected to a growing range of networks that deliver broadband data content and services once confined to the fixed-line world. Broadband has been liberated from its wireline leash, and consumers are increasingly free to surf, roam, communicate, watch and play from just about anywhere. Perhaps the best example of the impact of data growth on operators' revenue comes from Vodafone Group, which reported organic revenue growth of 25 percent for its data services for Q4 '08, while the organic growth of voice and messaging revenue remained flat. Clearly, mobile broadband will power the next phase of growth for the mobile industry.

> **"Mobile data traffic has surpassed voice to become the new king of the mobile industry."**

The Data Dilemma

The data opportunity doesn't come without its challenges. Bandwidth cost per subscriber for voice and messaging traffic is well understood, but the same can't be said for data. The amount of bandwidth consumed by different applications can vary dramatically. A text e-mail sent from a smartphone may use only one or two kilobytes (KB) of data with no stringent latency requirements, while downloading a Web page can consume 500 KB or more. And, video services can easily devour megabytes if not gigabytes of data with latency a key quality concern. Coda estimates that if the carriers froze their networks today, they would reach 100 percent utilization at peak capacity by 2012, when 40 percent of phones will be smartphones.

The growing number of mobile broadband users coupled with increasing bandwidth per user is creating a dilemma for operators: bandwidth capacity needs are outpacing the associated revenue. Industry analyst firm, Heavy Reading, estimates that bandwidth on 3G networks is growing at a rate of approximately 400 percent annually, while the associated revenue from data services is only growing by approximately 40 percent per year. Simply put, operators will be carrying more data per user for less revenue. As the traffic levels swell, operators are realizing that neither economics nor delivery architectures are keeping pace with the escalating demand for mobile broadband access.

Increasing Network Capacity with LTE

Faced with increasing broadband penetration, operators are looking to 4G technologies like long term evolution (LTE) to grow capacity and optimize their network architecture for data-enabled devices and applications. LTE, defined by the 3rd Generation Partnership Project (3GPP) in Release 8 standards and extended in Release 9, is an evolution of universal mobile telecommunications system (UMTS) technology.

Previous mobile architectures relied on two distinct domains: circuit-switched for voice and packet-switched for data. LTE introduces the evolved packet core (EPC), an end-to-end Internet protocol (IP) core network that creates a converged framework for delivering packet-based, real- and non-real-time

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applications across 3GPP and non-3GPP (CDMA, DSL, cable, etc.) access networks. The 3GPP network core separates the control and data planes to improve performance and creates a simpler, flatter architecture by moving a number of functions from the network core to the network edge. Deploying LTE allows operators to build and maintain one core network and to more effectively utilize IP-based access methods such as femtocells and dual-mode devices to offload the macro radio network. The end result: greater bandwidth, reduced latency, lower operational costs and improved network performance for time-sensitive services such as mobile video, mobile TV and web browsing.

The Need for Policy Control

A key component of the EPC architecture is the policy and charging rules function (PCRF), which performs dynamic bearer and bandwidth control, charging rules provisioning and, in certain cases, lawful intercept control. The PCRF is a centrally located policy decision point from which operators can dynamically control usage of the network and how much to charge for particular services. The PCRF communicates with core network systems (e.g., the EPC's packet data network gateway or a deep packet inspection system), applications and operational support systems/ business support systems platforms to manage subscriber and network information according to operator-created business rules. These rules define

> **"The coupling of LTE with policy control promises to help resolve key mobile broadband economic challenges."**

how broadband network resources are allocated to subscribers and applications and under what conditions. For example, during periods of congestion, an operator can throttle back bandwidth and resources to users who agree to pay less for a non-guaranteed class of service and allocate QoS-backed resources to those who have paid for the highest level of performance.

The EPC of Release 8 requires a PCRF for some obvious reasons and some not-so- obvious reasons. The most obvious reason is that as services are implemented from foreign and non-3GPP networks with widely varying QoS and cost metrics, a service will perform and cost differently based on which network the user is located. For example, most femtocell and dual-mode services encourage use of the local network by exempting any voice call minutes and data usage from the user's quota. The payoff for the operator is removing the traffic from the macro radio network. At the same time, operators want to make sure the service works as well if not better than the same service on the macro radio network — moving on-net voice calls to VoIP using an over-the-top, broadband connection won't be successful if the calls lack clarity.

The not-so-obvious reason has been demonstrated by UMTS and HSPA networks and will continue to be an issue with the greater bandwidth of an LTE network. In pre-UMTS networks, users could be provided as much bandwidth as the network could support because there was so little bandwidth available to a single user. With data rates growing tremendously, the use of multiple tiers of bandwidth and QoS is becoming much more common — either as a further point of differentiation for market segmentation, or to control network abuse. Looking at fixed-line networks that are capable of very high bandwidth services shows what is likely to be in store for LTE networks — just because the network can deliver 30Mbps doesn't mean customers are going to get that level of service automatically. FTTx and DOCSIS 3.0 networks are capable of delivering up to 100Mbps at virtually the same cost as today's 5 to 10Mbps networks, but without government incentives, the very high speed services generally cost two to four times what basic service costs.

Challenges Ahead

In legacy data environments, operators used provisioning systems, such as authentication, authorization and accounting (AAA), to configure profiles. These profiles were applied only once when the user established a data session. This static approach was sufficient when a one-size-fits-all, flat-rate model ruled. However, as demand for personalized services continues to grow, mobile providers must be able to differentiate based on service level, subscriber tier, roaming and location status, network condition, and application. Furthermore, they must be able to make these distinctions both at session startup and during the middle of a session. In order to economically scale their operations, increase revenues and retain customers, providers need a centralized policy control solution for managing the increasing sophistication of broadband applications.

Along with the challenges involved with offering differentiated services comes the issue of managing the associated bandwidth consumption. The basic economics of network cost versus subscriber value that have driven broadband deployment are under pressure as bandwidth growth threatens to tilt against providers.

This matter has become especially pressing in light of the rapid increase in the use of video and data-enabled mobile devices. Coda Research predicts

that mobile video will account for 68.5 percent of all mobile data usage in the US by 2015. Smartphones are expected to consume as much as 50 times more bandwidth than voice-centric handsets. Exponential increases in data traffic can choke networks to the point where a substantial number of users may encounter poor service experiences. Without intelligent solutions in place for managing the dramatic growth in bandwidth consumption, consumers are likely to become frustrated with degraded service, especially during peak-usage hours.

Conclusion

While LTE networks will deliver more raw bandwidth, all of that bandwidth could be quickly consumed by video or other bandwidth-intensive applications if operators don't effectively manage their users with a real-time, targeted policy approach. From prioritization to tiering, the coupling of LTE with policy control promises to help resolve key mobile broadband economic challenges and support a new generation of revenue-generating services. Equipped with intelligent policy management, operators can shape and manage network demand, revenue contributions from differing classes of customers, capital expenditures and overall growth of the mobile broadband market.

About Tekelec:

Tekelec, the broadband data management company, enables billions of people and devices to surf, talk, and text. Our solutions allow service providers to give consumers a consistent and tailored broadband experience. We handle network complexity with a portfolio that manages and capitalizes on the exponential growth in data applications and traffic. Tekelec has more than 25 offices around the world serving customers in more than 100 countries.