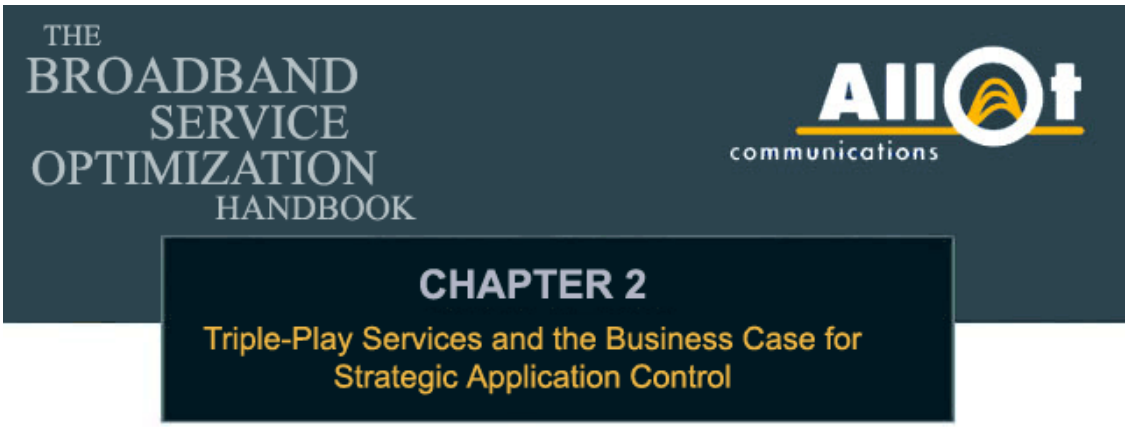


Network service offerings must expand to meet the requirements of a growing variety of subscriber bases. The "triple-play" services package of converged voice, data, and video delivered by a single provider over a common pipe is fast becoming status quo, for example. Service providers around the globe are striving to keep pace with these and other changing market demands.

At the same time, changes in the technology to deliver these services are presenting service providers with new and unprecedented bandwidth opportunities and challenges. For every technological advance that increases bandwidth potential—metro-area Ethernet, passive optical networks (PON), fiber-to-the-home (FTTH), packet switching and convergence, for example—another technological advance seems to arrive to gobble up that bandwidth. Among these are peer-to-peer (P2P) applications, streaming media, interactive real-time collaboration applications, and gaming.

**Delivering Service, Speed, and Price**

Success for today's service provider means competing in three areas: service, speed, and price. Service providers must deliver the types of services that will increase average revenue per user (ARPU), such as the triple-play services described, according to a May 2006 survey by worldwide researcher Infonetics, Inc. (see figure). They must also do so at speeds that are reliable and consistent and at prices that meet or beat those of the growing number of broadband competitors, including

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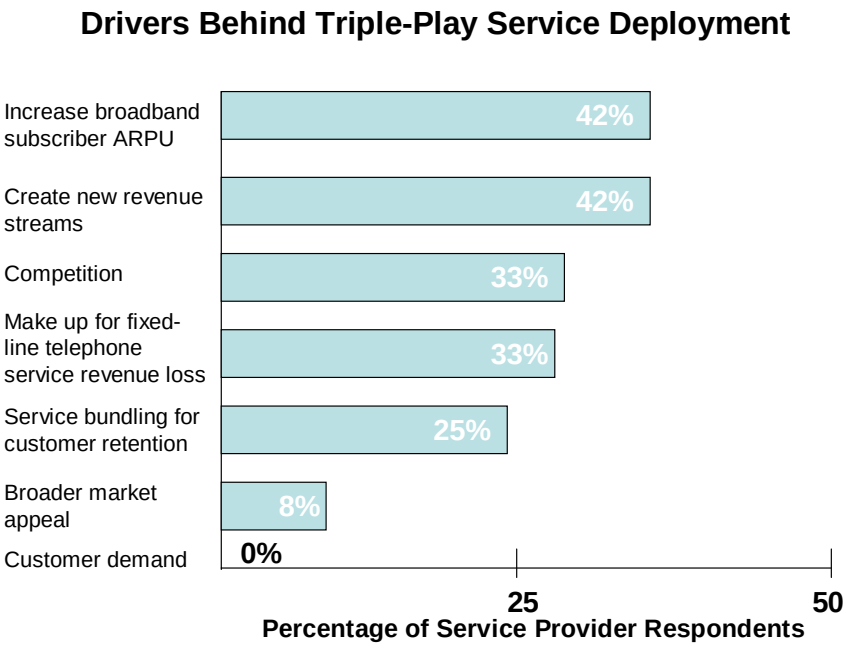
both traditional and Greenfield operators. With the variety of applications competing for bandwidth among a range of business and residential customers, delivering a competitive service can seem overwhelming. How can you meet the ever-increasing demand for bandwidth and real-time response times while still turning a respectable profit?




***Source: Infonetics, Inc., May 2006 N=12 (North America, Europe, Asia)***

Historically, the most commonly applied solution to demands for improved performance has been to add more bandwidth. However, that approach has become not only cost-prohibitive, but futile: No sooner is bandwidth increased by the addition of costly equipment than new applications arrive designed to use the capacity, often degrading the experience of other subscribers. For this reason, many service providers are finding that their success at delivering service differentiation,

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consistent speed and service levels, and competitive prices on a converged network now depends on intelligently monitoring and managing network traffic rather than merely adding capacity to solve performance problems.

## Bandwidth Hogging and its Drain on ARPU

Service providers depend on both business customers and premium-package consumer subscribers to keep ARPU at an acceptable level and, with the addition of new services, to increase it. But when a small number of subscribers—often residential customers paying a minimal monthly fee—exceed their contracted amount of capacity, the result is a lack of "IP fairness" to other subscribers and overall network service degradation. Resulting customer churn deflates ARPU while carriers face the costs of adding infrastructure in attempts to keep up with bandwidth demand.

Bandwidth "hogging" can be caused by recurrent heavy downloads and the frequent use of P2P and other file-sharing applications. P2P content, for example, is difficult to detect and control because it is not server based, traversing the network directly between end clients. Only special application-recognition tools such as those in service optimization systems can identify—and, with the right protocols in place, *control*—P2P activity on the network to ensure IP fairness. Left unchecked, P2P applications can degrade essential premium services such as consumer-oriented triple-play packages and mission-critical business applications, leaving the provider's business at risk.

## Creating a Diverse Services Portfolio

Instead of being at the mercy of a "best effort" system that doesn't ensure subscriber fairness, network operators can use traffic service optimization systems to determine application-specific, per-subscriber bandwidth rates and usage consumption. As the network operator, you can classify traffic according to a special policy unique to each subscriber. You can also reserve bandwidth for real-time

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sessions, block certain types of traffic, and use packet marking for downstream prioritization, depending on the service for which the subscriber has contracted.

These capabilities enable network operators to create a diverse services portfolio that offers varied pricing plans depending on the services purchased (for example, discount billing for triple-play subscriber packages). The service optimization systems, which function in part as service provisioning systems, give you the flexibility to offer tiers of differentiated services using the systems. The service categories can be based on contracted rates, usage, applications, and service plans.

Though you can apply different policies to different subscribers, you might apply some policies commonly to certain traffic types across all subscribers. For example, voice over IP (VoIP) would likely be treated as top-priority traffic that you might always put in a special, front-of-the-line service class with a service description such as “Platinum” or “Gold.”

Similarly, you might choose to dump P2P into a low-end “best-effort” class across the board. Another alternative is to charge subscribers wishing to use P2P applications an additional fee per kilobyte once they have exceeded a certain volume of usage. Not only would the pay-for-what-you-use approach ensure fairness and cover your infrastructure and capacity costs, it would help temper the high usage of P2P on the part of users unwilling to pay the extra fees required.

### Investing in Knowledge, Not Infrastructure

Having the knowledge about who is using the network for what purpose at which times is a function of network monitoring. It gives the service provider not only the ability to create a portfolio of new services and pricing plans, but also allows you to determine both short- and long-term requirements for equipment, infrastructure, protocols, and service options. Application control—prioritizing, shaping, and managing the behavior of packets on the network for optimal performance—enables network efficiency so that you invest less in capital (routers, switches, and network capacity) and operations, including troubleshooting. Service optimization can usually

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delay the acquisition of additional bandwidth and may even reduce current bandwidth needs.

When existing policies are not adequate to address unforeseen or new traffic patterns that may degrade network performance, a service optimization system will alert you to make changes in policies to address the situation. For example, if a new gaming application or a spike in P2P use threatens the successful support of real-time voice and video applications, you can remedy conditions with a rapid, real-time policy change to cap P2P usage or reserve a chunk of bandwidth specifically available for VoIP at all times.

The network monitoring component of the service optimization system allows service providers to determine how to control traffic behavior on a per-customer basis. Having subscriber management capabilities allows a service provider to limit traffic generated by a given user to the subscriber's contracted service level and, as mentioned, to offer a variety of subscriber packages at different price points to increase ARPU. Knowing customer behavior in depth allows you to target individual customers with specially marketed package offerings and upgrades that meet their specific needs and behaviors.

**Chapter Summary**

To increase ARPU and create new revenue streams, many service providers are turning to triple-play services. However, in converging their networks to do this in a cost-effective and integrated fashion, service providers face challenges from bandwidth-hungry P2P, gaming, and other applications that degrade and clog their networks.

Service optimization systems offer cost-effective alternatives to expensive infrastructure additions as a means of controlling network resource usage. They also make it possible to add differentiated services and tiered payment-plan options to subscribers by driving the network operator's usage control down to the subscriber level. Traffic monitoring, application control, and subscriber management combine to

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help service providers deploy revenue-generating services, gain a competitive foothold in a crowded service provider market, and deliver a stronger bottom line.

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