



[www.pipelinepub.com](http://www.pipelinepub.com) Volume 4, Issue 10

## **Deep Packet Inspection: Key to the Broadband Future**

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No modern business sector has demanded more and faster adaptability to change than the service provider industry. No sooner is a service provider paradigm established than another one — with new provisions, new services, and new technology — takes its place. For today's service providers, those who adapt to subscriber needs and demands will survive and thrive, while those who do not will ultimately fold. Incorporating new content-based and value-added services into the product offerings will not only attract dissatisfied users from other providers, but also reduce churn among existing subscribers and increase average revenue per user (ARPU).

Deep packet inspection technology, known as DPI, closely inspects and identifies network traffic by user and application type, helping to transform the service provider network from a system of "dumb" transport pipes to "content-aware" service pipes. DPI has been highly instrumental in facilitating the provisioning of today's content-based and value-added services for cutting-edge providers, and is continuing to be essential to guaranteeing the quality of those services. Importantly, DPI is paving the way for new services as part of innovative packages offered in the future.

In this article, we will look into the future of content-based and value-added services and what form they might take. We will also explore how the use of a powerful DPI engine will help enable and ensure the success of these services of the future.

### **The Services of Tomorrow**

It is difficult to know exactly what services subscribers will be clamoring for in the future, but based on the behavior of consumers today, tomorrow's "must haves" are likely to constitute an eclectic mix of content-based services (like high-performance gaming) and additional value-added services that content tends to give rise to, like parental control and denial of service protection. The specific mix of services consumed by individual subscribers will also vary widely as users seek to customize their broadband experiences to their own unique requirements.

If all these specialized services could come from their service provider, both the subscriber and the provider would benefit from a single source for multiple services.

For example, a subscriber could purchase a personalized service package that provides high-speed Internet access, parental controls, and intrusion detection — providing a complete set of solutions with the ease of one-stop shopping.

The same service provider might offer a new type of gaming package that meets the requirements of the growing number of users who participate in massive multiplayer gaming. For other customers, this service provider might devise a series of packages that include high-quality web TV, high-quality VOIP, and other specialized services that are currently being provided by independent vendors.

In short, the proliferation and provision of content-based and value-added services by service providers has a future that seems boundless. What appears certain is that with so many possible combinations, these services will be made up of highly personalized packages.

What then, is DPI's role in the provisioning of these new services?

### **DPI Enables Value-Added Services**

We have seen how DPI can optimize service delivery and extend the capabilities of existing network infrastructures to allow them to handle more traffic more efficiently *without* incurring costly infrastructure additions before they are needed. DPI can further help providers offer content-based and value-added services as part of a platform that combines best of breed services with the power of a DPI engine. Here are two examples of how these services can benefit from DPI.

#### **Parental Control**

Parental control on the Internet is achieved by filtering suspect URLs coming over the network. Without DPI, all URLs have to go through the URL filtering system, which puts a load on the URL filtering system and slows down the service. DPI working in conjunction with an URL filtering system provides:

1. Classification of the traffic and redirection of only the suspect traffic to URL filtering system
2. Reduction of the possibility of misclassification and delays
3. Refinement for the URL filtering system, which now has to handle only the "pure" traffic and is no longer bogged down processing all http or port 80 traffic
4. Improvement of the QoE of the filtered subscribers

#### **Denial of Service Protection**

Dedicated denial of service (DoS) applications provide advanced levels of DoS protection. These applications are able to detect subtle DoS attack types, protect against network penetration, and provide sophisticated protection based upon anomalies and signatures. If offered by service providers, this type of protection would allow the providers to detect and correct attacks being directed to subscribers as well as those unknowingly being propagated by subscribers. DPI working in conjunction with a DoS system provides:

1. Identification of subscribers who purchase the service

2. Immediate detection and direction of any DoS activity to the DoS service protection system for signed-up subscribers
3. Optimal performance for the DoS service protection system

Combined with QoS control, DPI also allows the service provider to prioritize traffic so that latency-sensitive applications, such as WebTV and VoIP, do not deteriorate due to jitter or dropped or delayed packets. DPI can be highly instrumental in the detection of intrusions and malware and, as noted, can help prevent DoS attacks. Controlling traffic by knowing what is moving on your network is essential to URL filtering and parental control services, and as detailed above, DPI's insight at the granular level allows providers to ensure that only what is wanted (and paid for) by the subscriber gets through.

Allocating bandwidth through fine-grain monitoring, which is DPI's hallmark, is also key to ensuring suitably low latencies for online video gaming. What was once just a couple of players or a small team initiating the gaming traffic now involves massive numbers of people around the globe, some of whom are playing professionally, and mounting streams of gaming traffic. DPI can help providers offer the fast response times required by gamers, while at the same time preserving bandwidth for other, non-gaming subscribers.

### Choosing a Carrier-Grade DPI System

What should you look for when deciding on which DPI system to invest in?

First, the DPI system you choose must be able to *perform* at the speeds needed today (10+ Gbps) and include the capability to scale upward as the need for increased speed arises. In addition, the DPI system needs to accommodate hundreds of thousands of subscribers and millions of IP flows simultaneously, without a loss in the subscriber's QoE.

Second, it's important to choose a system with a powerful DPI engine that provides Layer 7 application awareness, network intelligence, and visibility to all services being provided. The DPI system also needs to have the power to inspect traffic flows in real-time at line speeds introducing little or no latency as it identifies the applications traversing the network.

Third, openness and compliance with industry standards are important factors when choosing a DPI system. An open, standardized platform will ensure providers are not locked into proprietary equipment and protocols. Industry standards also encourage the best of breed third party value-added application vendors to become part of the platform. Some examples of telecommunications industry standards are:

- **AdvancedTCA** or Advanced Telecom Computing Architecture — which is a series of standard specifications that incorporate the latest trends in high-speed interconnect technologies, next generation processors, and improved reliability, manageability and serviceability, resulting in a new blade (board) and chassis (shelf) form factor optimized for communications
- **NEBS** or Network Equipment Building System — which outlines a set of safety, spatial, and environmental design guidelines applied to telecommunications equipment in the United States

## **Conclusion**

As service providers face the never-ending challenges of keeping up with subscriber usage trends and stiff competition, they are turning to content-based and value-added services as a way of increasing revenue streams. The insights and control afforded by DPI allow service providers to personalize the services they offer their subscribers, resulting in more satisfied customers and reduced churn, and generating increased ARPU. DPI systems should be chosen based on their openness and compliance with industry standards, their proven capabilities, and their performance reputation.

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