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Networking 2.0

Who's Managing the Next Generation?

BY TIM WATERS, VICE PRESIDENT OF BIVIO NETWORKS

By 2010, 20 homes will generate more traffic than the entire Internet did in 1995, according to the Internet Innovation Alliance. As that suggests, today's networking discussion is no longer about mere connectivity. Rather, in this age of YouTube, streaming radio, peer-to-peer (P2P) applications and other heavy consumers of bandwidth, it's about policy. Namely, what constitutes fair use of network resources and who sets those policies?

It's a pressing question for service providers and carriers as high-bandwidth traffic on their networks surges and shows no signs of abating. To cope, they've been employing a number of strategies. Comcast, for example, has admitted to slowing bandwidth-heavy applications such as P2P, which by various estimates accounts for anywhere between 20 and 90 percent of all Internet traffic. Other providers restrict bandwidth on a per-user basis. The rationale is easy to see: Time Warner Cable says that more than 50 percent of the bandwidth consumed by its subscribers can be traced to just 5 percent of its users. Blocking bandwidth hogs seems like a quick fix.

However, proponents of so-called Net Neutrality argue that once you pay for the service, you should be free to use it any way you wish. They also

say providers shouldn't be allowed to discriminate between which applications or types of data they allow, block or slow. On a similar note, both Congress and the Federal Trade Commission are investigating carriers' network management practices. Yet with file-sharing and use of rich media applications on the increase, carriers must do something.

How to manage Internet traffic on networks remains a politically charged issue for which there is no clear-cut

as what they contain and who is behind them. The underlying technology making this happen is deep-packet inspection (DPI). Simply put, DPI products allow service providers to monitor and control traffic at all layers of the protocol stack – including the application layer – based on set policies. This also helps ensure existing network infrastructure does not itself become a bottleneck as the speed of network operations increases.

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solution. It also poses fundamental questions: What is the network, and what should it be? Most of all, how should this new generation of networking be managed?

The Network is Evolving

Make no mistake: the network is in a state of transition. As bandwidth consumption surges, a more in-depth, nuanced approach to network management has been emerging which not only move packets from point A to B, but which also analyzes factors such

understand the who/what/where of network traffic is not limited to the service provider and carrier realm. Businesses and government agencies have also begun adopting DPI to better monitor, secure and filter their network. For all, network bandwidth is a scarce commodity.

Solving Service Providers' Business Challenges

While software-based DPI first found adoption with carriers and service providers, which relied on it to shape network traffic and ensure quality-of-service levels, providers have largely moved beyond using DPI for just traffic management purposes. True, going forward, some degree of traffic management will always be required to balance available bandwidth in equitable ways. But increasingly, service providers are viewing DPI, now procured in appliance form, as a critical tool for addressing their three main business priorities: to reduce capital expenses, reduce operating expenses and increase their revenue, which includes increasing revenue per user and decreasing customer churn.

Converge! One Minute Videos

DPI helps accomplish these goals in multiple ways. Perhaps most importantly, it allows providers to keep their complex networks secure. By using DPI to look more deeply into packets, providers can automatically detect and prevent attacks — such as devastating distributed denial-of-service assaults — as well as eliminate spam and malicious traffic. Maintaining “clean pipes” translates into network reliability and uptime, which is crucial for ensuring a satisfactory user experience and thus retaining customers.

The ability to secure the network and manage traffic more effectively also helps service providers make better use of existing infrastructure, which reduces their capital and operating expenses. More efficient network management practices likewise reduce operating expenses and decrease customer churn, increasing revenue. Finally, DPI helps

providers discover innovative new ways to monetize their networks and increase revenue and per-user revenue, for example via usage-based billing or by analyzing user behavior via data mining and delivering targeted content and advertising accordingly.

For example, six cable companies (Brighthouse Networks, Cablevision Systems, Charter Communications, Comcast, Cox Communications and Time Warner Cable) have recently launched a national platform for targeted television advertising dubbed Project Canoe. Experts predict it will not only track subscribers' cable-viewing but also — thanks to DPI technology — their Web-browsing habits, to create a better understanding of which content and advertising is of interest and most relevant to any given user.

Managing the Network of the Future

Exactly what the network of the future will look like likely depends most on how the Net Neutrality debate and similar policy decisions proceed. One thing, though, is clear: The days of “all you can eat” bandwidth allotments are over. Recently, both Comcast and Time Warner Cable began testing new approaches to managing Web traffic on their networks in a few target markets. For example, Comcast will begin limiting bandwidth on a per-user basis during peak traffic periods. Meanwhile, Time Warner Cable has been testing a “metering” plan whereby it would charge new subscribers \$1.00 for every gigabyte they downloaded beyond their monthly allotment.

Can service providers shape traffic and bill by the gigabyte? Despite moves on this front, some legislators, regulators, businesses and Net Neutrality

proponents have raised objections, especially in the United States. The debate revolves around this issue: Is the network an end-to-end medium, or is it one where the owners of the networks can impose tariffs however they see fit?

Not surprisingly, companies like Google and eBay argue that networks should remain free of any tolls, while many service providers would prefer to disaggregate networks. Meaning instead of a single information expressway, they'd also offer less expensive byways with correspondingly lower tolls and perhaps their own advertising.

Meanwhile, hard-line Net Neutrality proponents argue that subscribers should be able to do whatever they like, whenever they like. But really, few people would probably prefer such a vision take effect, given the potential for ongoing network degradation, and it's doubtful it ever would.

Capacity v. Usage v. Pricing

In an ideal world, subscribers would have unlimited capacity (bandwidth), unlimited usage (all-you-can-eat downloading and uploading), and all for a fixed price. Business realities, however, dictate that you only have a choice of two. The third is a tradeoff. For example, say a service provider offers a fixed-price plan. Unless the provider can shape traffic, then it is on the hook for an unlimited investment in capacity, without any increase in revenues to pay for it. From a business standpoint, this is untenable.

One response is to restrict capacity on a per-user basis during peak periods. Another option is to eliminate fixed pricing: pay more to download more. Another is to eliminate unlimited usage

and give users a monthly download cap, and then charge for every additional gigabyte they download. No approach is necessarily better than another, and service providers seem to be trying them all. What is common to them all, though, is that they're enabled by DPI.

Enterprises and Government Agencies Tap DPI

While service providers are among DPI's most ardent adopters, businesses and government agencies have also begun utilizing DPI to better monitor, secure and filter their network. Uses include guarding against data leakage and insider attacks, detecting and preventing intrusions, network-side database security, implementing network access controls and application-level firewalls, and filtering out dangerous or inappropriate sites and spam.

In the government sector, the rationale for more widespread DPI adoption is for information assurance purposes. This weighty sounding concept essentially means the practice of network security and monitoring. For example, the U.S. Department of Defense as well as the Defense Information Systems Agency (DISA) are using Bivio equipment as part of their next-generation networking platform. Their goal is to know who's on their network, what they're doing and where they're going, and to restrict access to information based on data classification and users' clearance levels.

Using DPI While Maintaining Privacy

These are quite appropriate uses of DPI. Of course, context is everything. If service providers started monitoring subscribers too closely, they might run afoul of privacy regulations in the United States, Europe and other regions – even though DPI can be used to

monitor traffic while maintaining an acceptable degree of privacy.

As that implies, a balance is required. As an example, take Google, a company that is an expert in monetizing its network despite potential privacy

concerns. In exchange for personalized advertising – and no doubt because of the lightning-fast search responses – users typically surrender a little privacy in return for personalization, as well as a guarantee that their personal details won't be divulged. So people have learned to live with a balance of slightly less privacy for something in return.

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It's All About How You Use It

As DPI evolves from being an issue just about connectivity into one with a strong policy component, it's useful to remember that the technology can be used for good, such as maintaining network integrity while blocking spam, attackers and child pornography, plus improving search results. But it can also be used for bad – tracking and monitoring citizens, stifling free expression. Like so much technology, however, DPI itself is not inherently good or bad. And in instances where it is used inappropriately, this doesn't mean you should throw out the baby with the bathwater.

that it was doing no such thing. "The tools built into our products that enable site filtering are the same the world over, whether sold to governments, companies or network operators," he said. In other words, it's not about the technology, it's about how you use it.

Should regulations specify how DPI may be used? Chandler suggested in not so many words that if legislators wanted to craft such policies, Cisco would be happy to discuss them. Reassuringly, Senator Dick Durbin (D-Illinois) also noted, "This is not a black and white issue." In other words, what's needed first isn't new legislation or regulations, but rather discussion.

Shaping the Architecture of Next-Generation Networks

This would be fruitful, since as with so many disruptive new technologies, DPI's capabilities have leaped ahead of widespread understanding of the technology and left scant time to agree on acceptable use. Furthermore, the

importance and power of DPI only continues to increase. In fact, DPI is nothing less than the dominant technical trend that's shaping the architecture of next-generation networks. That's not just for carriers, but also in the enterprise, in data centers and for government agencies.

As networks grow and bandwidth consumption increases, DPI in one form or another will be instrumental in ensuring networks run well and can be monetized to their utmost while also guaranteeing users' privacy and improving overall network security, monitoring capabilities and connectivity. And while these particular applications may not always be labeled as DPI, if you look under the hood, you'll find it.

About the Author

Tim Waters has more than 18 years experience in marketing data and telecommunications products and services. He is responsible for overall marketing and product management of Bivio networking appliances.

Prior to joining Bivio, Waters was vice president of marketing and business development at NetDevices, Inc., a leading supplier in the emerging enterprise service gateway marketplace. He has held similar positions at SkyStream Networks, a manufacturer of IP video headends, and Onetta, Inc., where he led the creation of the intelligent optical engine market. Waters previously was vice president of marketing and business development for Promatory Communications, a leading supplier of next-generation DSL access multiplexers, subsequently acquired by Nortel Networks. Earlier in his career Waters served as vice president of data product management for Ameritech in Chicago, Illinois, and

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Waters holds an MBA from the Harvard Graduate School of Business Administration and a BA in economics from College of the Holy Cross.

About Bivio Networks

Bivio Networks is the leading supplier of next generation network appliance platforms, enabling application developers to rapidly develop and deploy market-leading, wire-speed, deep-packet processing network applications. Companies developing and deploying applications on Bivio's network appliance platforms achieve dramatic increases in applications performance while significantly reducing their product development costs and accelerating time-to-market.

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