

Akamai to Enable Web for DVD and HD Video

By: The Online Reporter

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Akamai made two announcements this week. One is that in general it intends to optimize its content delivery network to support the delivery of DVD- and HD-quality video. Akamai is the largest content delivery network with over 25,000 servers installed in ISPs in 750 cities in 70 countries. It describes its service as delivering from the "edge" of the Net, as close to the consumer as it can get.

The second announcement was more specific and concerns a new technology called Large File Download Optimization (LFDO) that enhances the delivery of the large files that are required for high- definition video. Akamai describes LFDO as "a system for storing, retrieving and delivering large files as a cluster of individual file pieces," making it sound somewhat like the P2P technology that outfits like BitTorrent and its ilk use.

Akamai says it's responding to consumer demands for HD video and the ever-larger files that HD requires, made possible by the rapid spread of broadband, the availability of higher-quality videos, larger and inexpensive consumer storage and online gaming.

The technology, Akamai said, also has uses in the business world such as for the delivery of anti-virus updates and software.

Watching HDTV is like a baby bird that's learned to fly - there's no going back. That holds true for Internet-delivered videos just as much as it does for what comes from the pay-TV companies. So great is the demand for HD television that DirecTV is putting maximum energy (and money) into launching enough satellites that it can offer 150 HDTV channels to its subscribers.

1080i, 1080p or 720p

Akamai, the leading service for delivering Web content and applications, recognizes the demand for high-definition video.

Because of this, it's bringing HD to the Net with what it calls its "unique" edge distribution architecture. Its network is "specifically tuned for optimal delivery of HD files online" by reducing latency and increasing capacity.

The company acknowledges that HDTV is defined to be video with significantly high pixel resolution of 1080i, 1080p or 720p. Akamai says it's making the HD Web possible by continuing to refine the infrastructure required to bring the HDTV experience to online audiences. It promised to lead the move to an HD Web with new service launches, device integration and partnerships with technology vendors in the coming months.

Following consumers' current mad rush to buy HDTV sets, the pay-TV services - cable, satellite and phone - are all scrambling to provide as many HD channels as they can.

"As broadband connectivity becomes more ubiquitous, users are demanding - and frankly should expect - a high-quality, high- definition video experience on the

Internet," said Akamai CTO Mike Afergan. "Delivering premium HD content is a critical way for our customers to attract and delight their audiences in today's highly competitive media environment.

Afergan said the market is just now at the beginning of "a very exciting market opportunity for delivering premium HD content."
Consumer demand exists, he said, broadband is ready and businesses are looking for ways to maximize the value of their high-production HD content."

Akamai has listed what it thinks are the necessary technical criteria for delivering HD video over the Net. It claims to be the first and only service to meet those requirements:

- Technology and an operational model to operate serving devices in the largest high-throughput networks around the world. Servers, it said, need to be physically in the networks because that's where the capacity lies.
- Established relationships with the largest high-throughput networks.
- Support for delivery, storage and management of files greater than 2GB.
- Support of VC-1 and MPEG-4 video standards, achieving visual parity with other broadcast video networks.
- Support for files with resolutions of 720p, 1080i and 1080p.
- Client-side technology that is deeply integrated into its delivery system to be deployed as appropriate.

Akamai said that industry studies have proven that without meeting these criteria, online audiences will become impatient, tune out and find premium HD content elsewhere. By ensuring these requirements are met, content providers are able to avoid slow or delayed downloads, the inability to serve HD content in its entirety, download interruptions, limited audience reach and overall poor end- user satisfaction, which often accompany the download of large files.

In addition, according to Akamai, multiplayer compatibility is crucial to meet the needs of a diverse end user community.

Is the Market Ready?

"As broadband video viewership has escalated, consumers have raised the stakes by demanding better and better content experiences," said Will Richmond, president and founder of Broadband Directions LLC, a market intelligence and consulting firm specializing in broadband- delivered video. "To deliver against these requirements, media and entertainment companies need to offer higher bit rate files with enhanced online fidelity of video and audio files. Doing so in a scalable and cost-effective manner requires that the necessary infrastructure to support high definition content must be deployed."

"The capacity to deliver high throughput files already exists at the 'edge' - leveraging the massive build-outs occurring in hundreds of individual networks," said Akamai's Afergan. "The challenge comes from how you tap into that capacity. The only way to solve this problem is to deliver from within these networks. For example, on our

distributed platform, we serve more than half of all the files, 500MB or greater, at more than 1.4 Mbps, and this is only increasing. This demonstrates that, by leveraging the right architecture, there are already a large number of end-users capable of downloading higher-quality content. This technical capability coupled with the market demand is exciting for the industry."

HD Quality Means Big Files, Really Big

To realize this same vision and fidelity in the online world, a two- hour feature-length movie would need to be encoded at a bit rate of at least 6 Mbps-8 Mbps, which would result in the file being a size of 5GB-8GB. This presents numerous technical challenges to deliver such a high-quality, large file. For instance, delivering a file encoded at 6 Mbps to an audience of one Nielsen ratings point (1,102,000 households) would require 6.6 terabits of sustained bandwidth, and that doesn't even take into account latency and network congestion.

Distance Matters

The availability of very large, last-mile bandwidth connections does not always mean that an end user will be able to completely leverage that access. A critical factor to enable high bit rate delivery of very large HD files is the proximity of the end-user to the server sending the file. As the distance from the server becomes greater, throughput dramatically decreases. Even a seemingly small distance can result in lost throughput due to lower throughput, higher packet loss and increased latency.

As an example, the only way to achieve 10 Mbps to 20 Mbps throughput for typical PC end-users is if the server is less than 20 milliseconds away. The more latency, the longer it takes to download the file, which interrupts the viewing experience and results in a poor end-user experience. Compared with other centralized models, the results that Akamai's network delivers for high-quality content are unmatched on a global scale.

Operating on the Edge

Broadband subscribers are guaranteed to have a faster download, and enjoy a quality HD experience, when downloading content from servers nearby the request. With servers distributed in over 750 cities, Akamai addresses these technology requirements with its edge delivery model that reduces latency to levels necessary for a quality HD experience. Because distance matters for high-quality large files, all content, whether it is frequently or rarely requested, must be served closest to the end user. Akamai's technology automatically and instantly spreads popular content on- demand for better scalability.

In addition, many large HD videos are not always watched in their entirety. Because of this, it is common to locally cache only the portion of a file that is most requested by end users, which on average is the beginning of the file or movie. This partial caching of HD video enables both popular and less popular, long-tail content to be served from the edge to guarantee optimal performance, the company said.

100 Tbps

"Akamai's goal is to be able to support 100 terabits per second of traffic. Our flexible and distributed architecture uniquely positions us to realize that vision and we are aggressively progressing toward that goal," said Afergan. "We are also committed to the long-term objective of building an ecosystem linking content owners, network providers and video platform players to ensure a superior HD Web experience wherever last-mile infrastructure permits."

Akamai's New Technology for an HD Web

The Large File Download Optimization technology allows Akamai's customers to increase file sizes in response to market demand. In fact, Akamai said, many companies are now finding it feasible to deliver full DVD images as large as 4GB-5GB over the Internet. As HD DVD and Blu-ray formats become popular, it is inevitable that file sizes will grow to 50GB or more.

"We've released a technology that dramatically enhances the delivery, and therefore user experience, of large files of all sizes," said Afergan. "As part of today's digital media experience, consumers are simply expecting access to richer and more broadband-intensive content. Leveraging our highly distributed architecture, Akamai has developed a unique approach to optimizing software and entertainment downloads, while creating a platform that will support the future growth in file sizes by businesses in all sectors."

The Three Paradoxes: Out-of-sequence Downloads, Fat Files and Partially Viewed Videos There are several challenges in delivering large files.

First, there's the plethora of average time to download a large file can be significant, and many applications may not download all data sequentially. In some cases, applications may actually download the last part of a file before the first part. Therefore, when only a small amount of a file is requested, or a user pauses a download, it can result in the download either failing or being delayed until after the entire file has been retrieved.

The second is the "fat file paradox" - why does data traveling at the speed of light often take such a long time to make it across the country? With the proliferation of large files on the Internet, users are finding that latency between the user and the file ultimately dictates throughput or the speed at which users can view content. In addition, network congestion and capacity problems further impact throughput, and these problems, coupled with the greater distance between server and end user, create additional opportunities for packet loss to occur, further reducing quality. The reduction in quality caused by limited throughput and increased packet loss may manifest itself in the delivery of a video encoded at a lower bit rate, or in a significantly increased wait time for a file download to complete.

Third, many large video files are rarely watched in their entirety. Therefore, it is helpful to many software and media delivery companies to store only the portion of a file that is requested by end users in the Akamai network. This way, only the requested portions will be efficiently distributed to the farthest reaches of the Internet.

This is important in both media and software downloads. If an end user requests the download of a 60-minute movie, for example, but only watches the first 10 minutes, Akamai's Large File Download Optimization allows Akamai to only cache the part of the file the user wants to watch and not have to cache the entire movie.

An end user might start to download a large 5GB software file, then pause halfway through the download, and resume 30 minutes later. Upon resuming the download, LFDO allows the Akamai network to only request the part of the file that has not yet been downloaded, rather than transferring the entire file again, significantly speeding up the process.